

PRIMAN USER'S GUIDE

Beta I Test Edition

by

Marilyn Hammond

This guide documents the software operation of the Prime Computer and its supporting systems and utilities at Independent Product Release (IPR) PRIMAN IPR Release Number - 21.0 (Rev. PRIMAN IPR Release Number - 21.0).

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ABOUT THIS BOOK

PRIMAN is a software product that monitors current system activity. It can also be used to collect system data over time and generate analytic reports of resource utilization.

NOTES TO THE READER

System administrators and system operators will find this document useful.

ORGANIZATION OF THIS GUIDE

The seven chapters and three appendixes of this guide are summarized below.

- o Chapter 1: Overview of PRIMAN
- o Chapter 2: Monitoring system activity through the PRIMON screens
- o Chapter 3: Collecting system data over time through PRIMON or by condensing a USAGE file
- o Chapter 4: Deciding on which PRIMAN reports to generate in order to analyze system activity
- o Chapter 5: Making PRIMAN requests and generating the reports

- o Chapter 6: Reading and interpreting PRIMAN reports
- o Chapter 7: Analyzing a system in order to enhance performance

Appendix A presents the PRIMON error messages.

Appendix B contains the PRIMAN error messages.

Appendix C describes steps that may be taken to customize the user environment.

Appendix D provides a list of abbreviations and a glossary of the terms used in this guide.

PRIME DOCUMENTATION CONVENTIONS

The following conventions are used in command formats, statement formats, and in examples throughout this document. Examples illustrate the uses of these commands and statements in typical applications.

<u>Convention</u>	<u>Explanation</u>	<u>Example</u>
UPPERCASE	In command formats, words in uppercase indicate the names of commands, options, statements, and keywords. Enter them in either uppercase or lowercase.	PRIMAN
lowercase	In command formats, words in lowercase indicate variables for which you must substitute a suitable value.	PRIMAN -OUT filename
Braces { }	Braces enclose a list of items. Choose one and only one of these items.	PRIMON { -HELP -H }
Ellipsis ...	An ellipsis indicates that the preceding item may be entered more than once on the command line.	PRIMON -USERS n1 [...n6]
Hyphen -	Wherever a hyphen appears as the first character of an option, it is a required part of that option.	PRIMON -STOP 11:30
Angle brackets in messages < >	In messages, a word or in words enclosed within angle brackets indicates a variable for which the program substitutes the appropriate value.	<pathname> is an invalid PATHNAME
Apostrophe ,	An apostrophe preceding a number indicates that the number is in octal.	'200

CHAPTER 1

INTRODUCTION

PRIMAN is a software product that lets you measure the performance of your system and generate analytic reports. PRIMAN consists of two components: a monitor (PRIMON) and an analytic report generator (PRIMAN).

PRIMON OVERVIEW

PRIMON (PRIMOS Monitor) identifies most system resources and displays how much they are being used on either a system-wide or per-user basis. To gather information about a system, PRIMON repeatedly collects statistics at a user-specified interval of time. At the beginning of this interval, PRIMON reads and saves the system meters from PRIMOS. At the end of the interval, PRIMON reads the meters again, calculates the differences, and converts some of these differences to percentages of the time interval.

To get the results, you direct PRIMON to either generate screen displays, or save measurement data in a file that can be processed by PRIMAN to generate resource-usage reports.

PRIMAN Overview

PRIMAN is the acronym for the Prime Analyzer. As a resource analyzer, PRIMAN takes resource data such as PRIMON files or condensed USAGE samples (USAGE Rev. 19.1 to 20 only), and generates analytic reports.

PRIMAN analyzes resources such as the CPU, the memory, the I/O, the controllers, and the disk drives. For these resources PRIMAN can provide calculations, on a system/machine or a per-user basis, for the following attributes.

- o The time used in servicing resource requests
- o The amount of the resource that is being utilized
- o The number of requests made to a resource
- o The request rate for that resource

The formats listed below are used by PRIMAN in preparing reports. All of these reports can be printed on a Printronix printer or, alternatively, on a line printer.

- o Chart Shows an attribute's number of units for each sampled clock time. The chart itself ranges from 0 to some maximum number of units, such as 0-100 for CPU utilization or 0-60 for page fault rate.
- o Comparitor Compares the values of an attribute for a group of objects. For example, compares the CPU utilization for each user or controller utilization for each controller.
- o Histogram Shows the number and percent of samples that fall into each subdivision of the range of values; this range can be, for example, 0-100 for CPU utilization and 0-60 for page fault rate. The cumulative percent of observations is also provided. The graph itself differentiates between the percent of observations for a particular subdivision and the cumulative percent.
- o Table of statistics Three types as shown below.
 - System For each attribute, provides the mean, minimum, and maximum in the stated units for the entire sampling period. All system statistics tables have the common attributes of CPU and I/O utilizations as well as the I/O and page fault rates. Other attributes are user-selected.
 - Controller/Disk The heading for each controller or disk drive shows its identification number and the number of samples taken. For each attribute of that

controller or disk drive, provides the mean, minimum, and maximum in the stated units for the entire sampling period.

- User

The heading for each user shows the user name and the number of samples taken. For each attribute of that user, provides the mean, minimum, and maximum in the stated units for the entire sampling period.

ANALYZING YOUR SYSTEM

This guide tells how to invoke PRIMON and PRIMAN to view your current system activity, collect data over time, and generate reports.

After telling you how to invoke PRIMON to monitor your system, this guide will take you through the PRIMON screens and show you how to use the displays to monitor your system effectively. Appendixes cover the changing of PRIMON's thresholds and the actions that you may take with regard to error messages that may appear when invoking PRIMON.

To perform an in-depth analysis of system activity, however, you need to collect system data over time into a file. This guide will show you how to use PRIMON to gather this data. If you have Rev. 19.1 to 20 USAGE files that you wish to submit to PRIMAN, contact your Customer Service Representative about having them condensed into acceptable PRIMAN input.

Once you have a file that contains system data over time, you can submit it as input to PRIMAN to generate reports that show resource utilization. If you are conducting an in-depth analysis of system activity, however, you need to decide which reports will most efficiently help you to identify such system bottlenecks as excessive CPU or I/O utilization. This guide identifies the features of each report type, tells you the situations for which each is best suited, states the resources and their attributes that may be studied, and provides you with a strategy for selecting reports to identify CPU and I/O bottlenecks.

After you have decided on which report styles PRIMAN should generate, you can make PRIMAN report requests as explained in this guide. These requests may be saved into a file, read from a file, modified, or deleted.

After PRIMAN has generated the reports that you have requested, you need to read and interpret them under the guidelines provided in this guide. When you suspect a bottleneck in some area of system activity, guidelines are also given for identifying them and possibly alleviating such an impasse condition.

CHAPTER 2

MONITORING SYSTEM ACTIVITY

The PRIMON tool may be used in two ways: to view current system activity on a series of screens, or to collect system data over time that can be used by the PRIMAN tool to generate analytic reports.

This chapter presents the method for monitoring system activity through the PRIMON screens. The next chapter tells how to use PRIMON to gather information about system activity and put it in a file that may be processed by PRIMAN.

INVOKING PRIMON TO VIEW THE DISPLAYS

This section presents the PRIMON command line and its arguments for viewing the monitoring displays. The most common arguments you will include in the PRIMON command line are when to start and stop monitoring, how often to take samples of resource use, and how many times to take samples. These arguments have default values as shown in the table below, so you may not need to include all of them upon invocation.

Unless you specify otherwise, PRIMON includes CPU and I/O use by users in its displays, which is useful in tracking down the causes of excessive resource utilization. If you must reduce system overhead while using PRIMON, you can tell PRIMON to ignore user or disk data, or to omit average bars in the displays.

To invoke PRIMON for viewing the monitoring displays, enter the following command line at PRIMOS level.

PRIMON [options]

Entering the PRIMON command with no arguments gives you the default session of PRIMON displays with bar graphs in which the screens are updated every 10 seconds. (You will be queried for your terminal type, however, unless it is specified in a global variable.) User and disk data appear in their respective screens, and the default number of users is six. Entering a Q (quit) will allow you to exit the tool.

The options for viewing PRIMON displays are listed and explained below.

<u>Option</u>	<u>Explanation</u>
-TTP type	Gives your terminal type, such as PT200, PST100, or PT45. This argument is unnecessary if you have a global variable .TERMINAL_TYPE\$ set.
-FREQ n	Provides the sampling interval in seconds, where n is an integer from 1 to 3600 (one hour). The default value of n for viewing the displays is 10. If you specify -FREQ but not -TIMES, then sampling continues until you quit from the PRIMON displays.
-TIMES n	Specifies number of samples to take before ending the command, where n may range from 1 to 32767. This option has no default; if -TIMES is omitted, sampling continues until the time specified by the -STOP option. If -STOP is also omitted, sampling continues until you quit out of the PRIMON displays.
-START [hh:mm]	Indicates the starting time of sampling in hour:minute format on a 24-hour clock; the default is the current time. If this option is omitted entirely, sampling begins immediately.
-STOP [hh:mm]	Assigns the stopping time of sampling in hour:minute format on a 24-hour clock. If this option is omitted entirely, sampling continues according to values given by the -TIMES option or until you quit from the PRIMON displays.

{-USERS} {-US	n1 [... n6]	Specifies up to six user numbers to be monitored. If this option is omitted, the six user processes that use the most CPU, I/O, or memory are shown.
{-NUMERIC} {-NUM		Causes the values on the screens to appear as numbers rather than bars.
{-NO_USER_DATA} {-NUD		No user-specific data is collected.
{-NO_DISK_INFO} {-NDI		No disk I/O data is collected.
{-NO_AVERAGES} {-NAV		For any item, only the bar for the current sample appears. The bar for the average calculated since the start of sampling does not appear.
{-HELP} {-H		Displays the PRIMON command line options.

After you invoke PRIMON to view the displays, the General System Metering screen appears at the specified time or immediately if you specified no start time. This screen displays PRIMON-collected data on it. This data collection and presentation continues until the specified end time or until you press Q to quit from the PRIMON monitoring session.

PRIMON also has other screens that display system activity information. The format and content of all PRIMON screens are shown and explained in later in this chapter. Error messages that may appear are listed and discussed in Appendix A.

PRIMON SCREEN FORMAT

Even though there are many PRIMON screens that provide information about system activity, the basic format of all screens is identical. Each PRIMON screen is divided into three parts: header, body, and footer. These parts are described in the following paragraphs.

The Header

A header appears at the top of each screen and consists of the following information:

- o Screen name
- o Current date
- o Current time in 24-hour:minute:second format
- o Length of the sampling period in seconds
- o Number of users logged in during the sample
- o Number of active users during the sample

The Body

The body of each screen (except the memory screen) consists of a series of system attributes, each of which has two bars to the right of it. The labels for each bar pair are CUR (current value) and AVE (average value since start of monitoring). The length of each bar shows the value of its corresponding attribute; this value is determined from the scale that appears at the top of the bars. (The memory screen has CUR bars only.)

If a bar cannot fully show the value of the corresponding attribute, a numeric value appears to the right of the bar.

If you are viewing the displays and wish to see numbers rather than bars, press N (for numeric). To switch back to the bar graph display, press N once more.

To freeze a screen at any time, press F (for freeze). When the screen is frozen, however, PRIMON continues to sample the system activity and calculate average values for system attributes even though these averages not appear on the frozen screen. You can return to regular sampling by pressing F again.

The bars for certain screen attributes have preset alarm threshold values. When an alarm threshold value is exceeded, the appearance of the bar changes from green to red (or from non-blinking to blinking for certain monochrome terminals). These alarm thresholds are identified later in this chapter as well in Appendix C. That appendix tells how to change these threshold values.

Note

Some monochrome terminals do not have the reverse video blinking capability.

If you included the `-NO_AVERAGES` option in the PRIMON invocation, no AVE bar appears on the screen.

The Footer

The footer of each screen consists of a series of abbreviated screen names and the letter keys that you may press to access these screens. Each letter key is enclosed in square brackets and appears to the left of its corresponding abbreviated screen name. These are listed below with the full name of each screen appearing to the right.

- o [*] MAIN - General System Metering
- o [S] System - System Interrupt Metering
- o [D] IO count - Controller I/O Operations per Second
- o [T] IO time - Percent Controller I/O Time
- o [L] Locates - Locate/Miss Metering
- o [R] ROAM - ROAM File Metering
- o [B] Block IO - Block I/O Metering
- o [C] User CP - User CPU Metering
- o [I] User IC - User I/O Metering
- o [M] User MEM - User Memory Metering
- o [H] Help - Help

The footer of the two Controller screens also has a range of disk drive numbers in square brackets as listed below where full name of the corresponding disk screen appears to the right.

- o [0-7] - Disk I/O Operations per Second
- o [0-7] - Percent Disk I/O Time

Note

You can see statistics for the disks of two controllers on the same screen by typing the numbers for the two controllers. PRIMON inserts a slash mark ("/") between the two numbers. If you want to see the disks of only one controller, type its number and press the RETURN key.

In addition, the footer tells which keys to press to freeze the screen display, change from bar to numeric display (or vice versa), or quit from the PRIMON monitoring session as listed below.

- o [F] Freeze
- o [N] Num/Bar
- o [Q] Quit

The next section lists and explains the PRIMON screens. A sample of each type of PRIMON screen also appears.

THE PRIMON SCREENS

PRIMON has twelve screens that show activities with the system and one that contains help information. These screens are listed below and explained in the rest of this section.

- o General System Metering
- o System Interrupt Metering
- o Controller I/O Operations per Second
- o Disk I/O Operations per Second (accessed via controller screen)
- o Percent Controller I/O Time
- o Percent Disk I/O Time (accessed via controller screen)
- o Locate/Miss Metering
- o ROAM File Metering
- o Block I/O Metering
- o User CPU Metering
- o User I/O Metering
- o User Memory Metering
- o Help

When you invoke PRIMON, the General System Metering screen appears. The contents of this screen are explained further in this section. The general strategy for moving from screen to screen to monitor your system is as follows.

- o The General System Metering screen is the basic screen for monitoring your system since it shows the total amount of CPU and I/O activity as well as the page fault rate and number of I/O operations. If performance seems slow or any bar is red (or blinks for certain monochrome terminals) you can investigate the possible causes by viewing another screen.
- o If the percentage of CPU utilization seems excessive, press **C** to view the User CPU Metering screen to see which users are causing the most CPU activity. (If you included the `-No_User_Data` option when invoking PRIMON, this user screen will be blank.)
- o If the percentage of I/O utilization seems excessive, press **I** to view the User I/O Metering screen to see which users are causing the most I/O activity. (If you included the `-No_User_Data` option when invoking PRIMON, this user screen will be blank.)
- o Access the other screens periodically to get a full picture of system activity.

Details of how to read and interpret each PRIMON screen are presented in the rest of this chapter.

General System Metering

This screen is the main display for system monitoring and is the first one to appear during a PRIMON monitoring session. The General System Metering screen may also be accessed at any time during a PRIMON session by pressing . The format of this screen is explained in the section PRIMON SCREEN FORMAT earlier in this chapter. Several bars on this screen have preset alarm threshold values which, when exceeded, change the bar color from green to red (or from non-blinking to blinking for certain monochrome terminals).

The General System Metering screen contains information about the total amount of CPU and I/O activity on the system, as well as the page fault rate and number of I/O operations. Each system attribute is discussed below.

Note

When the interpretation hints indicate excessive resource use, you could invoke PRIMON to study the system activity over time as described in Chapter 3. From this data, you could select, generate, and interpret PRIMAN reports as described in the rest of this guide to get a better idea of what is happening in your system.

Percent CPU is the percentage of time in which CPU time was charged to user processes. (For a P850, this is averaged between the two CPUs.) This value indicates how much of the CPU the users are consuming as well as all system overheads. This system attribute has a default threshold value of 75%.

Interpretation Hints

When the Percent CPU value exceeds its alarm threshold, the CPU may be quite busy. You should press C to view the User CPU Metering screen to determine which users may be causing the most CPU activity.

Percent I/O is the average percentage of time that the disks were busy. This system attribute has a default threshold value of 85%.

Interpretation Hints

When the Percent I/O value exceeds its alarm threshold, the I/O system may be quite busy. The following hints tell how to determine the cause.

```

-----
                                General System Metering
86-07-10.15:20:04 Period Sampled 10 Seconds Users Logged in 15 Active 5

      0    10    20    30    40    50    60    70    80    90   100
Percent      CUR  //////////////////////////////////////
CPU          AVE  \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\

Percent      CUR  /////
I/O         AVE  \\

Percent      CUR  //////////
IDLE        AVE  \\\\\\\\\\\

      0    10    20    30    40    50
Page Faults  CUR  /
per second  AVE  \

I/O count    CUR  /////
per second  AVE  \\

-----
[*] MAIN    [S] System  [D] IO count [T] IO time  [L] Locates
[R] ROAM    [B] Block IO [C] User CP   [I] User IO  [M] User MEM
[H] Help    [F] Freeze  [N] Num/Bar  [Q] Quit
-----

```

General System Metering Screen
Figure 2-1

Interpretation Hints, continued

When the Percent I/O, Page Fault, and IDLE values exceed their alarm thresholds, the system may be having to process too many page faults.

When the Percent I/O value exceeds its alarm threshold, but the one for Page Fault has not, press L to view the Locate/Miss Metering screen. On that screen, if the Miss Per Second value exceeds its alarm threshold, the system may be performing excessive file I/O.

When the Percent I/O value exceeds its alarm threshold, but the values for Page Fault, IDLE, and Percent Miss do not, you could press T to view the Percent Controller I/O Time screen or press D to view the Controller I/O Operations per Second screen to check that controller use is balanced across the system. From either of these controller screens, press the controller number(s) to verify that disk use is balanced for those controllers. Also, you may press I to view the User I/O Metering screen to determine which users may be causing the most I/O activity.

Percent IDLE is the percentage of idle CPU time. (For a P850, this is the average of the idle time between the two CPUs.) This shows roughly the percentage of CPU time not involved in user processes. This system attribute has a default threshold value of 15%. (The threshold is exceeded when Percent IDLE's value is between 0 and 15.)

Interpretation Hints

When the Percent IDLE value exceeds its alarm threshold, the CPU may not have enough idle time. You should press C to view the User CPU Metering screen to determine which users may be causing the most CPU activity. You could also press S to view the System Interrupt Metering screen; an AMLC value of 10% or more may be caused by noise on the lines.

Page Faults per second is the page fault frequency rate. This system attribute has a default threshold value of 10 page faults per second.

Interpretation Hints

When the Page Faults bar is red or blinks, the system may be performing an excessive amount of paging. Usually this situation is accompanied by exceeded thresholds for Percent I/O and Percent IDLE.

I/O Count per second is the average number of disk I/O operations per second, including both file system and paging I/O. This is not the sum of the page faults and locate misses, because either one can produce more than one I/O operation.

System Interrupt Metering

This screen shows the percentage of CPU time used by the clock, frontstop, and controller processes. The System Interrupt Metering screen may also be accessed at any time during a PRIMON session by pressing S. The format of this screen is explained in the section PRIMON SCREEN FORMAT earlier in this chapter.

Each system attribute shown in this screen is listed and explained below.

Clock is the percentage of CPU time used by the realtime clock service process.

Frontstop is the percentage of CPU time used by the P850 slave CPU realtime frontstop process. This number is always zero on non-P850 configurations.

Error is the percentage of CPU time not accounted for and presumably taken by interrupts, scheduler overhead, process exchange, and similar operations. This value is calculated as follows.

1. Add the percentages of the system interrupts, idle time, and CPU time charged to user processes. (For a P850, divide this total by two.)
2. Subtract this value from 100%; the result is Error. This value can be negative if one or more processes have been overcharged with respect to CPU time.

Disks is the percentage of CPU time used by the disk driver processes.

ICS_1 is the percentage of CPU time used by the intelligent line controller 1 process.

ICS_2 is the percentage of CPU time used by the intelligent line controller 2 process.

SMLC is the percentage of CPU time used by the SMLC (synchronous multiline controller) process.

System Interrupt Metering

86-07-10.15:20:04 Period Sampled 10 Seconds Users Logged in 15 Active 5

Percent of CPU	0	10	20	Percent of CPU	0	10	20
Clock	CUR //			SMLC	CUR		
	AVE \				AVE		
Frontstop	CUR			AMLC	CUR /		
	AVE				AVE \		
Error	CUR ///			MPC	CUR		
	AVE \				AVE		
Disks	CUR			GPP	CUR		
	AVE				AVE		
ICS 1	CUR			PNC	CUR ///		
	AVE				AVE \		
ICS 2	CUR			Async	CUR		
	AVE				AVE		
				Sync	CUR		
					AVE		

[*] MAIN	[S] System	[D] IO count	[T] IO time	[L] Locates
[R] ROAM	[B] Block IO	[C] User CP	[I] User IO	[M] User MEM
[H] Help	[F] Freeze	[N] Num/Bar	[Q] Quit	

System Interrupt Metering Screen

Figure 2-2

AMLC is the percentage of CPU time used by the AMLC (asynchronous multiline controller) process.

Interpretation Hints

An AMLC value of 10% or more may be caused by noise on the lines.

MPC is the percentage of CPU time used by the MPC (printer, punch, tape reader) processes.

GPP is the percentage of CPU time used by the GPPI (general purpose controller) processes.

PNC is the percentage of CPU time used by the PRIMENET Node Controller process.

Async is the percentage of CPU time used by the asynchronous communication controller process.

Sync is the percentage of CPU time used by the synchronous communication controller process.

Controller I/O Operations per Second

This screen provides information on the number of I/O operations on each controller. The Controller I/O Operations per Second screen may be accessed at any time during a PRIMON session by pressing D. The format of this screen is explained in the section PRIMON SCREEN FORMAT section earlier in this chapter. If you included the -NO_DISK_INFO option in the PRIMON invocation, this screen is blank.

Each system attribute on this screen is listed and discussed below.

Controller is the number of I/O transactions per second for each controller, identified by number.

Interpretation Hints

For these controllers, you should check that the average I/O activity is balanced between the controllers on the system.

Controller I/O Operations per Second
 86-07-10.15:20:04 Period Sampled 10 Seconds Users Logged in 15 Active 5

Controller	0	10	20	30	40	50	60	70	80	90	100
0	CUR ///										
	AVE \										
1	CUR										
	AVE										
2	CUR										
	AVE										
3	CUR										
	AVE										
4	CUR										
	AVE										
5	CUR										
	AVE										
6	CUR										
	AVE										
7	CUR										
	AVE										

[*] MAIN	[S] System	[D] IO count	[T] IO time	[L] Locates	
[R] ROAM	[B] Block IO	[C] User CP	[I] User IO	[M] User MEM	[0-7]
[H] Help	[F] Freeze	[N] Num/Bar	[Q] Quit		

Controller I/O Operations per Second Screen
 Figure 2-3

Disk I/O Operations per Second

This screen provides information on the number of I/O operations on all of the disks that belong to a specific controller. The Disk I/O Operations per Second screen is accessed from the Controller I/O Operations per Second screen by pressing a number from 0 to 7 to specify a controller.

Note

You can see statistics for the disks of two controllers on the same screen by typing the numbers for the two controllers. PRIMON inserts a slash mark ("/") between the two numbers. If you want to see the disks of only one controller, type its number and press the RETURN key.

When a Disk I/O Operations screen for one controller is being viewed, the same type of disk information for another controller can be accessed by pressing that controller's number.

The format of the Disk I/O Operations per Second screen is explained in the section PRIMON SCREEN FORMAT earlier in this chapter. If you included the -NO_DISK_INFO option in the PRIMON invocation, this screen is blank.

Each system attribute on this screen is listed and discussed below.

Cntrl is the number of the controller whose disk activity is displayed on the screen.

Drive is the number of I/O transactions per second for each disk belonging to the controller.

Interpretation Hints

For these disks, you should check that the average I/O activity is balanced between the disks on the system.

Disk I/O Operations per Second

86-07-10.15:20:04 Period Sampled 10 Seconds Users Logged in 15 Active 5

Cntrl	Drive	0	20	40	Cntrl	Drive	0	20	40
0	0	CUR ///			1	0	CUR //		
		AVE \					AVE \		
	1	CUR				1	CUR		
		AVE					AVE		
	2	CUR				2	CUR		
		AVE					AVE		
	3	CUR				3	CUR		
		AVE					AVE		
	4	CUR				4	CUR		
		AVE					AVE		
	5	CUR				5	CUR		
		AVE					AVE		
	6	CUR				6	CUR		
		AVE					AVE		
	7	CUR				7	CUR		
		AVE					AVE		

[*] MAIN	[S] System	[D] IO count	[T] IO time	[L] Locates	
[R] ROAM	[B] Block IO	[C] User CP	[I] User IO	[M] User MEM	[0-7]
[H] Help	[F] Freeze	[N] Num/Bar	[Q] Quit		

Disk I/O Operations per Second Screen
Figure 2-4

Percent Controller I/O Time

This screen provides information on the percentage of I/O time that was taken by each controller. The Percent Controller I/O Time screen may be accessed during a PRIMON session by pressing T. The format of this screen is explained in the section PRIMON SCREEN FORMAT section earlier in this chapter. If you included the -NO_DISK_INFO option in the PRIMON invocation, this screen is blank.

Each system attribute on this screen is listed and discussed below.

Controller is the percentage of I/O time that was taken for each controller on the system, identified by number.

Interpretation Hints

For these controllers, you should check that the average I/O activity is balanced between all of them.

Percent Controller I/O Time

86-07-10.15:20:04 Period Sampled 10 Seconds Users Logged in 15 Active 5

Controller		0	10	20	30	40	50	60	70	80	90	100	
0	CUR	////////////////////											
	AVE	\\											
1	CUR	////////////////////											
	AVE	\\											
2	CUR												
	AVE												
3	CUR												
	AVE												
4	CUR												
	AVE												
5	CUR												
	AVE												
6	CUR												
	AVE												
7	CUR												
	AVE												

[*] MAIN	[S] System	[D] IO count	[T] IO time	[L] Locates	
[R] ROAM	[B] Block IO	[C] User CP	[I] User IO	[M] User MEM	[0-7]
[H] Help	[F] Freeze	[N] Num/Bar	[Q] Quit		

Percent Controller I/O Time Screen
Figure 2-5

Percent Disk I/O Time

This screen provides information on the percentage of I/O time that was taken by each disk belonging to a specific controller. The Percent Disk I/O Time screen is accessed from the Percent Controller I/O Time screen by pressing a number from 0 to 7 to specify a controller.

Note

You can see statistics for the disks of two controllers on the same screen by typing the numbers for the two controllers. PRIMON inserts a slash mark ("/") between the two numbers. If you want to see the disks of only one controller, type its number and press the RETURN key.

When a Percent Disk I/O Time screen for one controller is being viewed, the same type of disk information for another controller can be accessed by pressing that controller's number.

The format of the Percent Disk I/O Time screen is explained in the section PRIMON SCREEN FORMAT earlier in this chapter. If you included the -NO_DISK_INFO option in the PRIMON invocation, this screen is blank.

Each system attribute on this screen is listed and discussed below.

Cntrl is the number of the controller whose disk activity is displayed on the screen.

Disk is the percentage of I/O time that was taken for each disk belonging to a controller.

Interpretation Hints

For these disks, you should check that the average I/O activity is balanced between all of them.

Percent Disk I/O Time

36-07-10.15:20:04 Period Sampled 10 Seconds Users Logged in 15 Active 5

Cntrl	Drive	0	50	100	Cntrl	Drive	0	50	100
0	0	CUR	//////////		1	0	CUR	//////////	
		AVE	\\\\\\\\\\\\\\				AVE	\\\\\\\\\\\\\\\\\\\\	
	1	CUR				1	CUR		
		AVE					AVE		
	2	CUR				2	CUR		
		AVE					AVE		
	3	CUR				3	CUR		
		AVE					AVE		
	4	CUR				4	CUR		
		AVE					AVE		
	5	CUR				5	CUR		
		AVE					AVE		
	6	CUR				6	CUR		
		AVE					AVE		
	7	CUR				7	CUR		
		AVE					AVE		

[*] MAIN	[S] System	[D] IO count	[T] IO time	[L] Locates
R] ROAM	[B] Block IO	[C] User CP	[I] User IO	[M] User MEM [0-7]
H] Help	[F] Freeze	[N] Num/Bar	[Q] Quit	

Percent Disk I/O Time Screen
Figure 2-6

Locate/Miss Metering

This screen provides information on the system's locate buffers. These buffers facilitate file I/O activity by providing copies of the most frequently-accessed pages. The system-default number of locate buffers is 64, but this number may be modified as explained in the System Administrator's Guide.

The Locate/Miss Metering screen may be accessed at any time during a PRIMON session by pressing L. The format of this screen is explained in the section PRIMON SCREEN FORMAT earlier in this chapter. The Miss Per Second bar on this screen has a preset alarm threshold value which, when exceeded, changes the bar color from green to red (or from non-blinking to blinking for certain monochrome terminals).

Each system attribute on this screen is listed and discussed below.

Locates Per Second is the number of calls, per second, made to the file system associative buffer manager, Locate. The Locate buffers store the most recently and most frequently accessed disk records, thus reducing disk I/O.

Miss Per Second is the average number of Locate misses per second. A miss occurs when the requested record is not in the buffers and has to be retrieved from the disk. This system attribute has a default threshold value of 20 misses per second.

Interpretation Hints

If the Miss Per Second value exceeds its alarm threshold, press * to view the General System Metering screen. On that screen, if the Percent I/O value exceeds its alarm threshold, the system may be performing excessive file I/O.

Percent Miss is the percentage of calls to Locate that did not find the desired disk record in the buffers and had to perform an I/O operation. This value plus Percent Found, Percent Same, and Percent Used (all of calls to Locate) should add up to 100%.

Interpretation Hints

If the Percent Miss value is greater than 15%, press * to view the General System Metering screen. On that screen, if the Percent I/O value exceeds its alarm threshold, the system may be performing excessive file I/O.

Percent Found is the percentage of calls to Locate that found the desired records already in the associative buffers.

Locate/Miss Metering

36-07-10.15:20:04 Period Sampled 10 Seconds Users Logged in 15 Active 5

		0	20	40	60	80	100	120	140	160	180	200	
Locates	CUR	//////////											
Per Second	AVE	\\\\\\\\\\\\											
Miss	CUR	//											
Per Second	AVE	\											

		0	10	20	30	40	50	60	70	80	90	100	
Percent	CUR	////											
Miss	AVE	\\											
Percent	CUR	////////////////////////											
Found	AVE	\\											
Percent	CUR	////////////////////////											
Same	AVE	\\											
Percent	CUR	///											
Shared	AVE	\											

[*] MAIN	[S] System	[D] IO count	[T] IO time	[L] Locates
[R] ROAM	[B] Block IO	[C] User CP	[I] User IO	[M] User MEM
[H] Help	[F] Freeze	[N] Num/Bar	[Q] Quit	

Locate/Miss Metering Screen
Figure 2-7

Percent Same is the percentage of calls to Locate that needed the same record that the process had just previously located.

Percent Shared is the percentage of calls to Locate for a record that was already in use by another process and thus is being shared.

ROAM File Metering

This screen provides information on the system's ROAM file activity. ROAM files are used in database applications, particularly PRIMEWAY. The ROAM File Metering screen may be accessed at any time during a PRIMON session by pressing R. The format of this screen is explained in the section PRIMON SCREEN FORMAT earlier in this chapter.

Each system attribute on this screen is listed and discussed below.

Read Requests Per Second is the number of read requests per second made to the ROAM files.

Write Requests Per Second is the number of write requests per second made to the ROAM files.

Retrieval Access Per Second is the number of times per second that ROAM file records were retrieved for reading during transactions.

Update Access Per Second is the number of times per second that ROAM file records were updated during transactions.

Non-Tran Access Per Second is the number of times per second that ROAM file records were updated exclusive of transaction activity.

ROAM File Metering

36-07-10.15:20:04 Period Sampled 10 Seconds Users Logged in 15 Active 5

		0	10	20	30	40	50	60	70	80	90	100
Read Requests	CUR	////////										
Per Second	AVE	\\										
Write Requests	CUR	////										
Per Second	AVE	\\										
Retrieval Access	CUR	////										
Per Second	AVE	\\										
Update Access	CUR	///										
Per Second	AVE	\										
Non-Tran Access	CUR	..										
Per Second	AVE	\										

```

[*] MAIN      [S] System  [D] IO count [T] IO time  [L] Locates
[R] ROAM      [B] Block IO [C] User CP  [I] User IO  [M] User MEM
[H] Help      [F] Freeze  [N] Num/Bar [Q] Quit

```

ROAM File Metering Screen
Figure 2-8

Block I/O Metering

This screen provides information on the system's block I/O activity. The Block I/O Metering screen may be accessed at any time during a PRIMON session by pressing B. The format of this screen is explained in the section PRIMON SCREEN FORMAT earlier in this chapter.

Each system attribute on this screen is listed and discussed below.

Block I/O Per Second is the number of block I/Os made in the system, per second.

Percent Read is the percentage of all block I/Os that were read operations.

Percent Write is the percentage of all block I/Os that were write operations.

Percent Awrite is the percentage of asynchronous block I/Os that were write operations.

```

-----
                                Block I/O Metering
-6-07-10.15:20:04 Period Sampled 10 Seconds Users Logged in 15 Active 5

Block I/O          0  10  20  30  40  50  60  70  80  90 100
Per Second    CUR  //////////
               AVE  \\\\\\\

Percent        0  10  20  30  40  50  60  70  80  90 100
Read          CUR  //////////////////////////////////////
               AVE  \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\
Percent       CUR  //////////
Write         AVE  \\\\\\\
Percent       CUR  ////
Awrite        AVE  \\

```

```

-----
[*] MAIN      [S] System  [D] IO count [T] IO time  [L] Locates
R] ROAM      [B] Block IO [C] User CP  [I] User IO  [M] User MEM
H] Help      [F] Freeze  [N] Num/Bar [Q] Quit
-----

```

Block I/O Metering Screen
Figure 2-9

User CPU Metering

This screen provides information on how much CPU activity each user is causing. The User CPU Metering screen may be accessed at any time during a PRIMON session by pressing C. The format of this screen is explained in the section PRIMON SCREEN FORMAT earlier in this chapter. If you included the `-NO_USER_DATA` option in the PRIMON invocation, this screen is blank.

The User bar on this screen has a preset alarm threshold value which, when exceeded, changes the bar color from green to red (or from non-blinking to blinking for certain monochrome terminals).

Each system attribute on this screen is listed and discussed below.

Percent CPU is the percentage of time in which CPU time was charged to all user processes. (For a P850, this is averaged between the two CPUs.) This value indicates how much of the CPU the users are consuming, but does not represent the total CPU utilization.

User Name is the number and login name of the user process whose percentage of CPU utilization is shown. The default situation contains information about the six users who caused the most CPU activity in the current sample period. If you wish to specify particular users, you should include the `-USERS n` option in the PRIMON invocation.

The User Name system attribute has a default threshold value of 50%.

```

-----
                                User CPU Metering
36-07-10.15:20:04 Period Sampled 10 Seconds Users Logged in 15 Active 5

Percent      0   10   20   30   40   50   60   70   80   90  100
CPU          CUR ///////////////
          AVE \\\\\\\

User      Name
36  ABCD   CUR ///////////////
          AVE \\\\\\\
5   EFGH   CUR \\\\\\\
          AVE \\\

```

```

-----
[*] MAIN    [S] System  [D] IO count [T] IO time  [L] Locates
[R] ROAM    [B] Block IO [C] User CP  [I] User IO  [M] User MEM
[H] Help    [F] Freeze  [N] Num/Bar [Q] Quit
-----

```

User CPU Metering Screen
Figure 2-10

User I/O Metering

This screen provides information on how much I/O activity each user is causing. The User I/O Metering screen may be accessed at any time during a PRIMON session by pressing I. The format of this screen is explained in the section PRIMON SCREEN FORMAT earlier in this chapter. If you included the -NO_USER_DATA option in the PRIMON invocation, this screen is blank.

The User bar on this screen has a preset alarm threshold value which, when exceeded, changes the bar color from green to red (or from non-blinking to blinking for certain monochrome terminals).

Each system attribute on this screen is listed and discussed below.

Percent I/O is the percentage of time in which I/O time was charged to all user processes.

User Name is the number and login name of the user process whose percentage of I/O utilization is shown. The default situation contains information about the six users who caused the most I/O activity. If you wish to override this situation, you should include the -USERS n option in the PRIMON invocation.

The User Name system attribute has a default threshold value of 50%.

```

-----
                                User I/O Metering
86-07-10.15:20:04 Period Sampled 10 Seconds Users Logged in 15 Active 5

Percent          0   10   20   30   40   50   60   70   80   90  100
I/O              CUR  /////
                  AVE  \ \

User   Name      CUR  ///
 36    ABCD      AVE  \
      5    EFGH   CUR  //
                  AVE  \

```

```

-----
[*] MAIN    [S] System  [D] IO count [T] IO time  [L] Locates
[R] ROAM    [B] Block IO [C] User CP  [I] User IO  [M] User MEM
[H] Help    [F] Freeze  [N] Num/Bar [Q] Quit
-----

```

User I/O Metering Screen
Figure 2-11

User Memory Metering

This screen provides information on how much physical memory each user is using. The User Memory Metering screen may be accessed at any time during a PRIMON session by pressing M. The format of this screen is explained in the section PRIMON SCREEN FORMAT earlier in this chapter. If you included the -NO_USER_DATA option in the PRIMON invocation, this screen is blank.

Each system attribute on this screen is listed and discussed below.

Pages Wired is the number of wired physical pages in use by all users.

Pages In Use is the number of physical pages in use by all users.

Total Pages on System is the number of physical pages on the system.

User Name is the number and login name of the user process whose use of physical memory appears on the screen as a percentage of memory. The default situation contains information about the six users who used the most memory. If you wish to override this situation, you should include the -USERS n option in the PRIMON invocation.

User Memory Metering

36-07-10.15:20:04 Period Sampled 10 Seconds Users Logged in 15 Active 5

Pages Wired 312 Pages In Use 2841 Total Pages On System 3072

User	Name	0	10	20	30	40	50	60	70	80	90	100
36	ABCD	////////										
5	EFGH	///										

[*] MAIN	[S] System	[D] IO count	[T] IO time	[L] Locates
[R] ROAM	[B] Block IO	[C] User CP	[I] User IO	[M] User MEM
[H] Help	[F] Freeze	[N] Num/Bar	[Q] Quit	

User Memory Metering Screen
Figure 2-12

The Help Screen

This screen provides information on the PRIMON screens and how to access them by pressing the various keys. This information is discussed earlier in the footer discussion of the section PRIMON SCREEN FORMAT. The Help screen may be accessed at any time during a PRIMON session by pressing H.

Help Screen

86-07-10.15:20:04 Period Sampled 10 Seconds Users Logged in 15 Active 5

There are 11 possible screens. Here is a brief description of each.

*	MAIN screen	General System Data
S	System screen	System Interrupt Data
D	Disk I/O Count	I/O Count per Second per Drive
T	Disk I/O Time	Percent of Total I/O Time per Drive
L	Locates	Locate Miss Information
R	ROAM	ROAM File Information
B	Block I/O	Block I/O Information
C	User CPU	CPU per User
I	User I/O	I/O per User
M	User Memory	Memory per User
H	HELP	This Screen
N	Num/Bar	Switch from Bar Display to Numeric or Numeric to Bar Display
F	Freeze	Freeze the display until "F" again or another screen is selected
Q	Quit	Quit and return to Primos

[*] MAIN	[S] System	[D] IO count	[T] IO time	[L] Locates
[R] ROAM	[B] Block IO	[C] User CP	[I] User IO	[M] User MEM
[H] Help	[F] Freeze	[N] Num/Bar	[Q] Quit	

The Help Screen
Figure 2-13

CHAPTER 3

COLLECTING SYSTEM DATA

When you want to have analytic reports of system activity for later study, you need to use PRIMON to collect system data over time into a file. Alternatively, if you have Rev. 19.1 to Rev. 20 USAGE files of system data that have been produced with the -ALL option, you can contact your Customer Service Representative about having them condensed into acceptable PRIMAN input.

This chapter presents the invocation command for PRIMON that will produce a file that can be submitted to PRIMAN for report generation as explained later in this guide.

INVOKING PRIMON TO COLLECT SYSTEM DATA OVER TIME

This section presents the PRIMON command line and its arguments for collecting system data over time into a file that can be the source of a variety of reports produced by PRIMAN.

In this PRIMON command line, the -OUTPUT argument is mandatory to collect system data over time into a file. With no other arguments, this PRIMON invocation causes PRIMON to collect samples every 300 seconds from the time that you enter the PRIMON command until you logout the PRIMON child process.

While PRIMON is collecting system data over time, you should not issue another PRIMON command to view the displays because you want the PRIMON file to record normal system use. System performance samples that include both display and file PRIMON activities detract from a true

picture of system use.

It is also helpful to note down the major applications that are running while PRIMON is collecting system data.

The most common arguments that you will include in the PRIMON command line are when to start and stop monitoring, how often to take samples of resource use, and how many times to take samples. All of these arguments have default values as shown in the table below, so you may not need to include all of them upon invocation.

To invoke PRIMON to collect system data over time, enter the following command line at PRIMOS level.

```
PRIMON { -OUTPUT } treename [options]
      { -OUT }
```

treename identifies the file to which a PRIMON-spawned child process collects data.

The options for the PRIMON -OUTPUT invocation are listed and explained below.

<u>Option</u>	<u>Explanation</u>
-FREQ <i>n</i>	Gives the sampling interval in seconds, where <i>n</i> is an integer from 1 to 3600 (one hour). The default value of <i>n</i> is 300. For collecting data, <i>n</i> should be at least 60 so that enough events can occur to represent average system performance. If you specify -FREQ but not -TIMES, then sampling continues until you logout the PRIMON child process.
-TIMES <i>n</i>	Specifies the number of samples to take before ending the command, where <i>n</i> may range from 1 to 32767. This option has no default; if -TIMES is omitted, sampling continues until the time specified by the -STOP option. If -STOP is also omitted, sampling continues until you logout the PRIMON child process.
-START [hh:mm]	Indicates the starting time of sampling in hour:minute format on a 24-hour clock; the default is the current time. If this option is omitted entirely, sampling begins immediately.
-STOP [hh:mm]	Assigns the stopping time of sampling in hour:minute format on a 24-hour clock. If this option is omitted entirely, sampling continues according to

values given by the -TIMES option or until you logout the PRIMON child process.

{-HELP}
{-H

Displays the PRIMON Help screen, which shows the command line format and the options.

Upon PRIMON invocation for collecting data to a file, the following messages appear.

Starting the Child Process ...

Child Process has started

If you had specified a START time, you will also see the following message.

Data Collection will start at hour:minute

These messages tell you that PRIMON has spawned a child process for collecting data to the specified file. PRIMON begins collecting data at the specified start time or immediately if you specified no start time. This collection continues until the specified end time or until you logout the child process. Error messages that may appear are listed in Appendix A of this guide.

CHAPTER 4

DECIDING ON A REPORT STRATEGY

Each PRIMAN report style has unique characteristics suitable for certain situations or tasks. This chapter tells you how to choose a report style based upon the sort of information that you want to obtain. The tables at the end of this chapter tell which resources and their attributes may be the subject of the PRIMAN reports.

If you wish to analyze a system to determine if there is a possible bottleneck on your system, you may use the recommendations in this chapter for which reports to generate Chapter 7 tells how to analyze these reports and also provides recommendations for enhancing system performance.

PRIMAN REPORTS AND THEIR PURPOSES

There are four PRIMAN report styles: chart, comparitor, histogram, and statistics. This section provides an overview of the features of each report style and the situations that may make you want to select it over other PRIMAN reports. For illustrations of each report type, see Chapter 6 in this guide.

Chart Report

A chart report gives you the exact measurements for a resource attribute for each sample in the time period specified. Thus, you can see how those measurements varied over time and find out, for example,

when CPU or I/O Utilization was heaviest. This can be useful for load balancing, choosing appropriate times of the day for batch runs, as well as verifying that a resource should be upgraded because it is too heavily loaded.

Comparitor Report

A comparitor report shows the range and mean statistics of a resource attribute over a list of objects such as users, disks, or controllers. Comparisons may be made between objects for maximum, minimum, and means, together with any asymmetry when the mean is nearer the maximum or the minimum.

Histogram Report

A histogram report allows you to see at a glance how the number of measurements taken of a resource attribute is spread over the possible range of measurements for that attribute. Thus, you can quickly see how often or seldom the CPU is heavily utilized, or what the most common page fault rate is. Cumulative measurement percentages are also shown that add up the total percent of measurements falling between the 0 and the current one. This information is useful to find out things like what percentage of measured values are greater than a given value.

Statistics Report

A statistics report shows the minimum, mean, and maximum measurements made of certain resource attributes for the period of time specified in the PRIMAN request. This report style is convenient because at a glance it gives statistics for a series of attributes. For example, if you select the statistics report for the Locate attribute, you also get CPU and I/O Utilization as well as I/O Rate and Page Fault Rate. This information will reveal possible system bottlenecks as described later in this guide. For more detailed study, you will want to generate the other report styles for the resource attribute in question.

All user statistics reports contain CPU and I/O Utilization as well as the segments used and pages used and wired. For more detailed study, you will want to generate the other report styles for the resource attribute in question.

The next section gives strategies for generating PRIMAN reports to analyze your system for possible bottlenecks.

STRATEGY FOR ANALYZING A SYSTEM FOR BOTTLENECKS

If you are analyzing a system to determine if there are CPU or I/O bottlenecks, you may use the following recommendations to determine which reports to generate. Chapter 7 provides details for analyzing these reports as well as guidelines for alleviating these bottlenecks.

Phase 1 Reports

You should generate the following system reports before you can begin to analyze your system for possible bottlenecks:

- o Statistics for the SYS-LOCATE resource and the Locate Misses attribute.
- o Histogram for the SYS-CPU resource and the ISU 1 Idle attribute. (ISU means CPU. Users of the 6550 and 850 processors should generate an additional histogram for ISU 2 Idle and analyze it as for ISU 1 Idle.)
- o Histogram for the SYS-IO resource and the IO Utilization attribute.
- o Histogram for the SYS-IO resource and the Page Fault Rate attribute.
- o Histogram for the SYS-LOCATE resource and the Locate Misses attribute.

In addition to giving information about the chosen attribute, all system statistics reports provide figures for CPU Utilization, IO Utilization, and Page Fault Rate. Thus, in one report you can tell if there are any obvious bottlenecks on your system.

The histogram for ISU 1 (and 2) Idle provides further information about how heavily the CPU is being used, because it shows how much of the CPU was not being utilized.

The histogram for I/O utilization shows how heavily the I/O is being used. If you suspect an I/O bottleneck, the histograms for Page Fault Rate and Locate Misses can indicate its cause as being excessive paging or excessive file I/O..

If you suspect that there is a bottleneck in the system from looking at the statistics and histograms, you will want to generate the reports for Phase 2.

Phase 2 Reports

Based on your analysis of the histograms in the previous section, you may need to perform a second level analysis of the data.

If you suspect either a CPU bottleneck or an I/O bottleneck that is caused by an excessive page fault rate or locate misses, you need to generate the following Chart Reports.

- o Chart for the SYS-CPU resource and the ISU 1 Idle attribute. (ISU means CPU. Users of the 6550 and 850 processors should generate an additional histogram for ISU 2 Idle and analyze it as for ISU 1 Idle.)
- o Chart for the SYS-CPU resource and the CPU Util. Error attribute.
- o Chart for the SYS-IO resource and the IO Utilization attribute.
- o Chart for the SYS-IO resource and the Page Fault Rate attribute.
- o Chart for the SYS-LOCATE resource and the Locate Misses attribute.

If you suspect an I/O bottleneck, but have not found the cause to be excessive paging or file I/O, you should generate the reports recommended in Phase 3. You should also proceed to Phase 3 if you suspect a CPU bottleneck and wish to see which users used the most of the CPU time.

Phase 3 Reports

In this phase, you may generate comparator reports to determine if there is unbalanced I/O. If you have a CPU bottleneck, you could also generate a comparator report for the system users.

- o Comparator report for the USER-CPU resource and the %CPU Time in Period attribute.
- o Comparator report for the SYS-DISK resource and the %Disk Drive Accesses attribute
- o Comparator report for the SYS-CONTRLR resource and the %Controller Operations attribute (for two or more controllers)

Phase 4 Reports

If you have not detected any other bottleneck, but have many instances where the ISU 1 Idle percentage is less than 10%, you may have a bottleneck in the system overhead processes. This could be caused by either improper configuration or a bad controller that is causing excessive interrupts.

To determine if you have excessive system overhead, you may generate a histogram for each of the following SYS-CPU attributes.

- o Clock Overhead
- o Frontstop Overhead
- o AMLC Overhead
- o MPC Overhead
- o PNC Overhead
- o Smlc Overhead
- o Ics Overhead
- o Gppi Overhead
- o Async. Overhead
- o Sync. Overhead
- o Disk Driver Overhead

Phase 5 Reports

If the interactive response time is usually greater than 1 minute and you have gone through analysis phases 1 to 4 without finding a probable bottleneck, you may check for semaphore or lock bottlenecks. To do this, you will need to use the histograms and charts that were generated in Phases 2 and 3 for the following attributes:

- o ISU 1 Idle
- o Locate Misses

ATTRIBUTES THAT MAY BE STUDIED

Tables 4-1 through 4-10 show which resources and their attributes may be studied through the PRIMAN reports.

Note

All system statistics reports include information on the following items, in addition to providing statistics for the requested attribute.

- o CPU utilization
- o I/O utilization
- o I/O operations
- o Page fault rate

All user statistics reports contain mean and range statistics for the following items, in addition to providing statistics for the requested attribute.

- o CPU time and utilization
- o I/O time and utilization
- o Pages used and wired
- o Segments used

Table 4-1
SYS-CPU Attributes

Attribute	Explanation
CPU Utilisation (%CPU)	The percentage of time in which CPU time was charged to user processes. (For a 6550 or 850 processor, this is averaged between the two CPUs.) This value indicates how much of the CPU the users are consuming, but does not represent the total CPU utilisation.
ISU 1 Idle (%Idl1)	The percentage of idle CPU time. (For a 6550 or 850 processor, shows the percentage of master CPU idle time.) This shows roughly the percentage of CPU time not involved in user processes.
ISU 2 Idle (%Idl2)	The percentage of idle CPU time for the 6550 or 850 slave CPU. This number is always zero on non-6550 or non-850 configurations.
CPU-Disk Overlap (%Ovlp)	An estimate of the amount of time that disk I/O activity overlapped CPU activity. This value ranges from 0 to 100%. The formula is calculated as follows: $(IO_time - idle_time) * 100 / IO_time.$
CPU Util. Error (%Error)	The percentage of CPU time not accounted for, and presumably taken by interrupts, scheduler overhead, process exchange, and similar operations. This value is calculated as follows. <ol style="list-style-type: none"> 1. Add the percentages of the system interrupts, idle time, and CPU time charged to user processes. (For a 6550 or 850 processor, divide this total by two.) 2. Subtract this value from 100%; the result is %Error. This value can be negative if one or more processes are overcharged with respect to CPU time
Clock Overhead (%Clock)	The percentage of CPU time used by the realtime clock service process.
Frontstop Overhead (%FNT)	The percentage of CPU time used by the 6550 or 850 processor slave CPU realtime front-stop process. This is 0 for other models.

Table 4-1 (Continued)
SYS-CPU Attributes

Attribute	Explanation
Amlc Overhead (%AMLC)	The percentage of CPU time used by the AMLC (asynchronous multiline controller) device driver that services all AMLC boards in a system.
Mpc Overhead (%MPC)	The percentage of CPU time used by the MPC (printer, punch, tape reader) processes.
Pnc Overhead (%PNC)	The percentage of CPU time used by the PRIMENET Node Controller process.
Smlc Overhead (%SLC)	The percentage of CPU time used by the SLC (synchronous line controller) device driver that services all synchronous lines on the following controllers for all synchronous products that can use these controllers. MDLC - Multiple Data Link Controller HSSMLC - High Speed Synchronous Multiline Controller SMLC - Synchronous Multiline Controller
Ics Overhead (%ICS)	The percentage of CPU time used by two interrupt processes that service and dispatch interrupts from ICS1 (Intelligent Communications Subsystem 1), ICS2, and ICS3 controllers. One process services the interrupts; the other handles requests from an ICS1, ICS2, or ICS3 for transmit or receive buffers.
Gppi Overhead (%GPPI)	The percentage of CPU time used by the GPPI (general purpose controller) processes.
Async. Overhead (%Async)	The percentage of CPU time used by the ICS asynchronous device driver, which services all asynchronous lines on all ICS1, ICS2, ICS3 controllers in a system.
Sync. Overhead (%Sync)	The percentage of CPU time used by the ICS synchronous device driver, which services all synchronous lines on all ICS1, ICS2, and ICS3 controllers in a system for all synchronous products except SNA.
Disk Driver Overhead (%DSK)	The percentage of CPU time used by the disk driver processes.

Table 4-2
SYS-IO Attributes

Attribute	Explanation
IO Utilization (%I/O)	The average percentage of time that the disks were busy.
IO Rate (IO/S)	The average number of disk I/O operations per second, including both file system and paging I/O. This is not the sum of the page faults and Locate misses since either one can produce more than one I/O operation.
Page Fault Rate (PF/S)	The page fault frequency in page faults per second.
Disk Accesses (Disk)	The number of disk I/O operations performed.
#Disk Queue Waits (Qwaits)	The number of times that a process had to wait to get a disk request block allocated.
%Disk Queue Waits (%Qwait)	The percentage of disk I/O operations that required waiting for a disk request block.
#Dma Overruns (DMAovr)	The number of disk operations that resulted in DMA overrun errors.
%Dma Overruns (%DMAovr)	The percentage of disk operations that resulted in DMA overruns.
#Disk Time Out Hangs (Hangs)	The number of disk operations that caused the controller to hang and time out.
%Disk Time Out Hangs (%Hang)	The percentage of disk operations that resulted in controller hangs.

Note

It is very rare for disk queue waits, DMA overruns, or time out hangs to occur.

Table 4-3
SYS-LOCATE Attributes

Attribute	Explanation
Locate Buffer References (Locates)	The total number of calls made to the file system associative buffer manager, Locate. The Locate buffers store the most recently and most frequently accessed disk records, thus reducing disk I/O.
Locate Misses (%Miss)	The percentage of calls to Locate that did not find the desired disk record in the buffers and had to perform an I/O operation.
Locate Hits (%Hit)	The percentage of calls to Locate that found the desired record. This is calculated as $100\% - \%Miss$.
Locate Finds (%Found)	The percentage of calls to Locate that found the desired record already in the Locate associative buffers.
Locate Same Hits (%Same)	The percentage of calls to Locate that needed the same record that the process had just previously located.
Locate Shared Hits (%Share)	The percentage of calls to Locate for a record that was already in use by another process.
Locate Access Rate (Loc/S)	The Locate use rate in calls per second.
Locate Miss Rate (LM/S)	The average number of Locate misses per second. A miss occurs when the requested record is not in the buffers and has to be retrieved from the disk.

Table 4-4
SYS-MEMORY Attributes

Attribute	Explanation
Segments Available (Segs)	The number of segments available. This value is set by the NSEG Configuration directive.
Segments Used (Used)	The number of segments in use.
Pages Available (Pages)	The number of physical pages available.
Pages Used (Used)	The number of physical pages in use.
Pages Wired (Wired)	The number of wired pages. Wired pages cannot be paged out of physical memory.

Table 4-5
SYS-CONTRLR Attributes

Attribute	Explanation
#Controller Operations (Count)	The number of disk I/O operations for a controller.
%Controller Operations (%Count)	The percentage of all disk I/O operations performed by a particular controller.
Time Used In Period (Time)	The time, in seconds, spent performing disk I/O operations on a controller. The per-drive information in some cases may not include time spent pre-seeking.
%Time Used In Period (%Util)	The percentage of time spent performing disk I/O operations by a controller.
%Controller Operations (%ops)	The percentage of the total number of disk I/O operations performed by a particular controller since boot.
Operations Since Boot (ops)	The percentage of the total number of disk I/O operations performed since boot by a controller.
%Controller Busy Time (%busy)	The percentage of the time that a controller was busy.

Table 4-6
SYS-DISK Attributes

Attribute	Explanation
#Disk Drive Accesses (Count)	The number of accesses done to a disk drive.
%Disk Drive Accesses (%Count)	The percentage of accesses to a disk drive out of the total number of accesses to all disk drives of a controller.
Disk Time Used In Period (Time)	The number of seconds used by the operations of a disk drive.
%Disk Time Used In Period (%Util)	The percent of time used by a disk drive in its operations out of the total time used by all disk drives of a controller.
Disk Accesses (since boot) (BCount)	The number of accesses done to a disk drive since boot.
%Disk Drive Busy Time (%Busy)	The percent of time since boot used by a drive in its operations out of the total time used by all disk drives of a controller.
Average Access Time (Avg)	The average time in milliseconds for each I/O operation on the drive since the system was booted. This gives an idea of how spread out the requests on the disk are. Drives with high locality of reference will show low times, and those with lots of seeking will show high times.

Table 4-7
SYS-ACTIVE Attributes

Attribute	Explanation
Active Users (Users)	The number of logged-in users who were conducting some activity.
Active Disk Controllers (Ctlrs)	The number of disk controllers that were performing some activity.
Active Disk Drives (Disks)	The number of disk drives that were performing some activity.

Table 4-8
USER-MEM Attributes

Attribute	Explanation
Non-Shared Memory (Mem)	The number of pages resident in memory for the user at the time the report was generated. Segments 0 through '3777 are allocated to user 1.
Pages Wired (Wire)	The number of wired pages in use by the user.
Segments Used (Segs)	The number of segments in use by the user.

Table 4-9
USER-CPU Attributes

Attribute	Explanation
CPU Time Since Login (CPUtime)	The CPU time, in seconds, used by this user since login.
CPU Time In Period (dCPU)	The CPU time, in seconds, used by this user.
%CPU Time In Period (%CPU)	The percentage of CPU time used by this user.

Table 4-10
USER-IO Attributes

Attribute	Explanation
IO Time Since Login (I/Otime)	The disk I/O time, in seconds, used by this user since login.
IO Time In Period (dI/O)	The disk I/O time, in seconds, used by this user.
%IO Time In Period (%I/O)	The percentage of time in which I/O (disk) was in progress for this user.

CHAPTER 5

GENERATING REPORTS

After having PRIMON collect system data over time, and deciding on a report production strategy that will enable you to analyze the activity on your system, you are ready to have PRIMAN generate reports.

This chapter provides the PRIMAN invocation command and presents the screens that must be filled with report parameters to produce PRIMAN report requests. Once PRIMAN request have been created, they can be saved into a file, read back from that file, modified, or deleted altogether.

INVOKING PRIMAN

To invoke PRIMAN at PRIMOS level, enter the following command line:

PRIMAN [options]

The options for viewing PRIMON displays are listed and explained below.

<u>Option</u>	<u>Explanation</u>
-TTP type	Your terminal type, such as PT200, PST100, or PT45. This argument is unnecessary if you have a global variable .TERMINAL_TYPE\$ set.
{-HELP} {-H }	Displays the PRIMAN command line options.

The Main screen for PRIMAN appears, as shown later in this guide.

INTRODUCTION TO THE PRIMAN SCREENS

PRIMAN has five screens, as briefly described below.

Main Screen	The first screen to appear after you invoke PRIMAN, the Main Screen displays the major fields of up to five PRIMAN requests, which show the request number, system or user report type, the resource to be studied, the report style, and the type of spooling device to be used. The Main Screen also has helpful information about the functions (and their keys) to use in PRIMAN as well as directions on how to fill the request fields.
Request Details	This screen contains all fields needed to complete any PRIMAN request. The help information presents the function keys. If you want help information about filling in the fields, you should access one of the detail screens described next.
Resource Details	Provide help information for the PRIMAN fields that also may be filled in on these screens.
Report Details	
Report Device Details	

To access any other screen from the Main screen, you must press the TAB (or BACK TAB) key to move the cursor to the appropriate field shown below and then press the F7 key to ZOOM-IN to that screen.

<u>Field</u>	<u>Corresponding Screen</u>
Request Number	Request Details
Resource	Resource Details
Report Style	Report Details
Device	Report Device Details

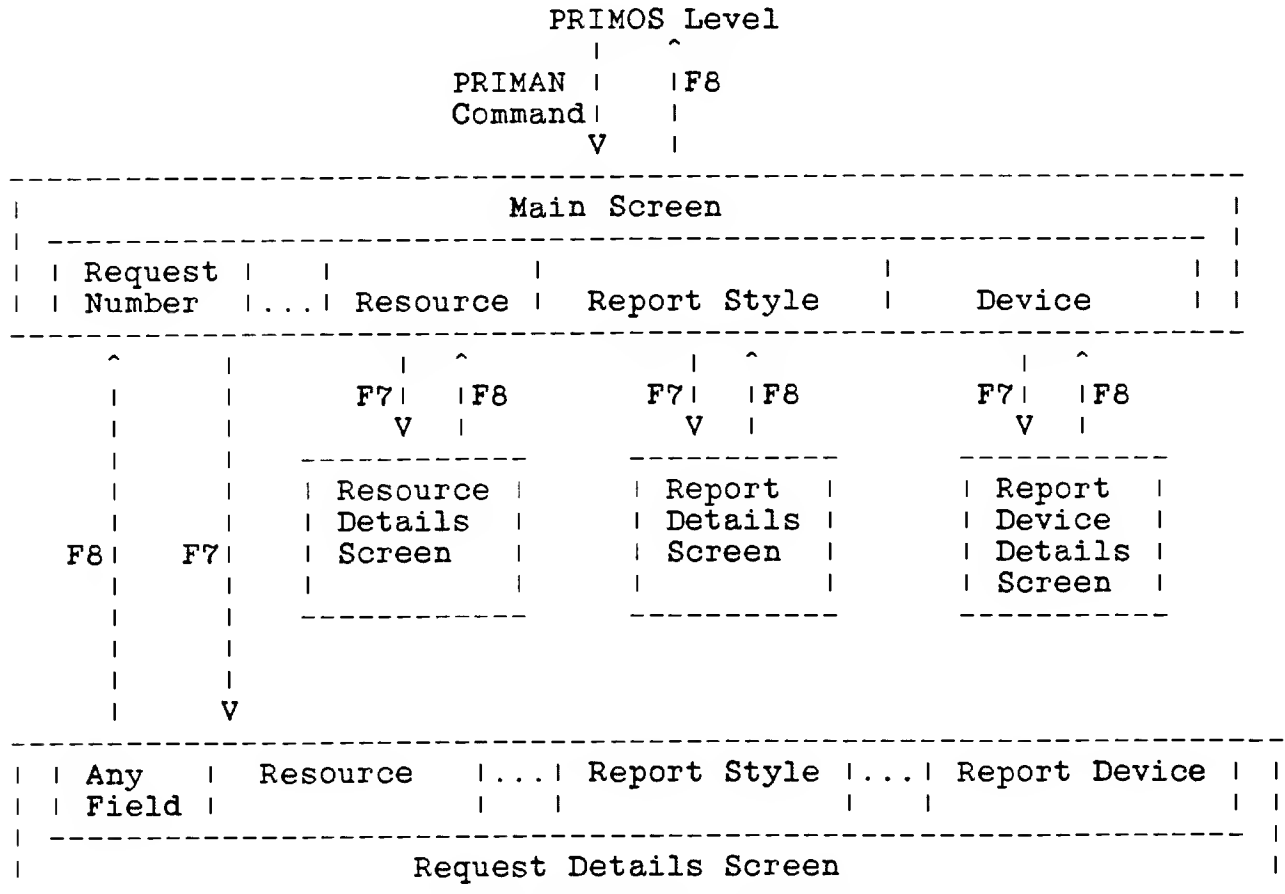
To return to the Main screen from the other screens, press the F8 (ZOOM-OUT) key.

From the Request Details screen you can also ZOOM-IN to the other details screen by tabbing to the Resource, Report Style, or Report Device fields and pressing the F7 key.

When you press F8 to leave the Resource Details, Report Style Details, or Report Device Details screen, PRIMAN returns you to the Main screen.

If you press F8 from the Main screen, however, PRIMAN returns you to PRIMOS level. Before PRIMAN does this, however, it asks you if you want to save your requests as explained in section EXITING PRIMAN TO THE PRIMOS LEVEL.

A summary of how to access the PRIMAN screens appears in Figure 5-1.



Accessing PRIMAN Screens

Figure 5-1

All PRIMAN screens are shown and explained later in this guide.

MOVING THE CURSOR AROUND

You may use any of the following keys to move the cursor from field to field. Once the cursor is in a box, however, only pressing the TAB (or BACK TAB) key will move the cursor out of the box.

TAB
BACK TAB
RETURN
ENTER

When you type something in a field, PRIMAN checks that the entry is correct before it lets you move the cursor out of that field. If the entry is incorrect, PRIMAN displays an error message. Appendix B lists the PRIMAN error messages and provides recommendations for taking action.

PRIMAN messages appear on the screen enclosed in a box. When a brightly colored box encloses the message, you must press either RETURN or CANCEL to make the message disappear. (Instead of CANCEL, PST100 users should press ERASE and PT45 users should press F9.)

If you have pressed F5 and the cursor is in an auto-select box, use one of the Arrow keys (Up, Down, Forward, and Backward) to move the cursor around. Don't press ENTER to try to move the cursor in an auto-select box -- this action tells PRIMAN that you have selected the entry that the cursor was beside.

To leave an auto-select box without selecting an entry, press the CANCEL key; press ERASE and F9 for PST100 and PT45 users, respectively.

FILLING THE SCREEN FIELDS

To fill in a field on a PRIMAN screen, you may either type in the information directly, or press the F5 to use an auto-select menu if that field has one. (The fields that have an auto-select menu are Request Style, Resource, Attribute, Report Type, and Report Device.)

Directions are provided in each auto-select menu for selecting an entry. These tell you to move the cursor beside the desired entry and press the ENTER key.

Note

The Resource Details Screen, Report Details Screen, and Report Device Details Screen are all subset screens of the overall Request Details Screen. Therefore, when you fill in a field on one screen, PRIMAN automatically fills in that same field (where it exists) on the other screens.

Certain fields of a PRIMAN request must be filled in before PRIMAN can process that request. These required fields are listed below.

Request Number
Request Type
Resource
Attribute
Report Style
Data File
Report File
Report Device

The next sections present the PRIMAN screens and describe their contents.

THE MAIN SCREEN

This screen is the main display for PRIMAN and appears in Figure 5-2 with sample requests. It is the first PRIMAN screen to appear when PRIMAN is invoked.

The format of the Main screen has three parts: header information field-filling directions, a PRIMAN functions list, and the major request fields. Field-filling directions were presented in the previous section of this guide, so the following paragraphs describe the functions list and major fields.

PRIMAN Function List

A list of functions that may be performed with PRIMAN appear at the lower right of the display. You may invoke any of these functions at any time while viewing any screen. There are two ways of invoking these functions as explained below.

- o Press the F6 key, which presents the following message:

```

-----
| Point to an item and press <ENTER> to select it |
| Press <CANCEL> to do nothing.                   |
|                                                    |
| 1: Create a new processing request                |
| 2: Process the current requests                  |
| 3: Save requests to a PRIMOS file                |
| 4: Read requests from PRIMOS file                |
| 5: Auto selection of field options               |
|                                                    |
-----

```

To select a function, move the cursor to it and press ENTER.

- o Press any of the F1 through the F5 keys to select a function. Pressing the F1 key selects the first function listed in the message shown above, that of creating a new processing request: pressing the F2 key starts the processing of current requests, and so on.

Each function is explained later in this chapter.

The Major Request Fields

The top half of the Main screen contains the major PRIMAN request fields. All of these fields must be filled before a PRIMAN request can be processed. Each field is listed and explained below.

Number contains the number of the PRIMAN request. To fill in this field, press the F1 key. The message "New Request Created..." appears and the Number field now contains the next sequential request number. This field has no auto-select options. If you had pressed the F5 key, the following message would appear.

There is no automatic selection for this field. Use the create function key to generate a new request.

When you press the F7 key when the cursor is in the Number field, the Request Details screen appears. This screen contains all fields necessary to specify any PRIMAN request, but it does not contain the help information that the other PRIMAN detail screens have. The Request Details screen is presented and explained later in this chapter.

Request Type specifies whether PRIMAN is to conduct a system-wide or per-user analysis of data. This field also appears in the Request Details screen that is presented later in this chapter. Pressing the F5 key when the cursor is in this field results in the following auto-select message.

```

-----
| These are the possible selections for this field. |
| Point to an item and press <ENTER> to select it; |
| It will be filled in for you automatically.      |
| Press <CANCEL> to do nothing.                    |
|                                                    |
| 1: SYSTEM oriented analysis                      |
| 2: USER   oriented analysis                     |
-----

```

Main Screen

Request Number	Request Type	Resource	Report Style	Device
+---+	+-----+	+-----+	+-----+	+-----+
1	SYS	SYS-IO	STATISTICS	PTX
2	SYS	SYS-CPU	HISTOGRAM	PTX
3	SYS	SYS-IO	HISTOGRAM	PTX
4	SYS	SYS-CPU	CHART	PTX
5	SYS	SYS-IO	CHART	PTX
+---+	+-----+	+-----+	+-----+	+-----+

This is the PRIMAN main screen.
There are three ways to fill out
a new request after it is created:

- At each field use <F5> to get options, then <F7> to zoom-in
- At each field enter your own values, then <F7> to zoom-in
- <F7> to zoom-in at the number fld and enter complete request

Functions are accessed either by
the menu key <F6>, or from <F1-5>
Function key and menu options are:

- Create a new processing request
- Process the current requests
- Save requests to a PRIMOS file
- Read requests from PRIMOS file
- Auto selection of field options
<F6> gets the local menu

<F1-5> = PRIMAN Functions <F6> = MENU <F7> = ZOOM-IN <F8> = ZOOM-OUT(quit)

Main Screen
Figure 5-2

To fill in this field, either use the auto-select feature or type the words SYSTEM or USER in the Request Type field.

Resource specifies the system resource that PRIMAN is to analyze. This field also appears in the Request Details screen and the Resource Details screen; both are presented later in this chapter. Pressing the F5 key when the cursor is in this field results in the following auto-select message when your request type is SYS (system).

```

-----
| Point to an item and press <ENTER> to select it |
| Press <CANCEL> to do nothing.                   |
|                                                  |
| 1: SYS-CPU                                     |
| 2: SYS-IO                                     |
| 3: SYS-LOCATE                                 |
| 4: SYS-MEMORY                                 |
| 5: SYS-CONTRLR                               |
| 6: SYS-DISK                                  |
| 7: SYS-ACTIVE                                |
|                                                  |
-----

```

If your request type is USER, the following message will appear when you press the F5 key.

```

-----
| Point to an item and press <ENTER> to select it |
| Press <CANCEL> to do nothing.                   |
|                                                  |
| 1: USER-MEM                                  |
| 2: USER-CPU                                  |
| 3: USER-IO                                   |
|                                                  |
-----

```

To fill in the Resource field, either use the auto-select feature or type the resource name as it appears in the message above.

When you press the F7 key when the cursor is in the Resource field, the Resource Details screen appears. This screen is explained later in this chapter.

Report Style states which report type is to be generated. This field also appears in the Request Details screen and in the Report Details screen; both are presented later in this chapter. Pressing the F5 key when the cursor is in this field results in the following auto-select message.

```

-----
| These are the possible selections for this field. |
| Point to an item and press <ENTER> to select it; |
| It will be filled in for you automatically.      |
| Press <CANCEL> to do nothing.                    |
|                                                    |
| 1: CHART          style report                    |
| 2: COMPARITOR    style report                    |
| 3: STATISTICS    style report                    |
| 4: HISTOGRAM     style report                    |
|                                                    |
-----

```

To fill in this field, either use the auto-select feature or type the report type as it appears in the above message. These report types are described below:

- o Charts show an attribute's number of units for each sampled clock time. The chart itself ranges from 0 to some maximum number of units, such as 0-100 for CPU utilization or 0-60 for page fault rate.
- o Comparitors show comparisons of the values of an attribute for a group of objects, such as comparing the CPU utilization for each user or the controller utilization for each controller.
- o Tables of statistics provide the mean, minimum, and maximum in the stated units for the entire sampling period for the items being analyzed by PRIMAN.
- o Histograms show the number and percent of samples that fall into each subdivision of the range of values; this range can be, for example, 0-100 for CPU utilization and 0-60 for page fault rate. The cumulative percent of observations is also provided. The graph itself differentiates between the percent of observations for a particular subdivision and the cumulative percent.

When you press the F7 key when the cursor is in the Report Style field, the Report Details screen appears. This screen is explained later in this chapter.

Device specifies the type of printer to be used in spooling the report -- a Printronix graphics printer or a line printer. This field also appears in the Request Details screen and the Report Device Details screen; both are presented later in this chapter. Pressing the F5 key when the cursor is in this field results in the following auto-select message.

```
-----  
| These are the possible selections for this field. |  
| Point to an item and press <ENTER> to select it; |  
| It will be filled in for you automatically.      |  
| Press <CANCEL> to do nothing.                    |  
|                                                    |  
| 1: LinePRinter output report                      |  
| 2: PrinTroniX  output report                      |  
-----
```

To fill in this field, either use the auto-select feature or type the abbreviations PTX or LPR in the Device field.

When you press the F7 key when the cursor is in the Device field, the Report Device Details screen appears. This screen is explained later in this chapter.

The next section presents the rest of the PRIMAN screens and tells how to fill in the fields of those screens to make PRIMAN requests.

THE REQUEST DETAILS SCREEN

This display, shown in Figure 5-3 with a sample request, contains all of the fields that are necessary to make any PRIMAN request. It does not, however, contain the help information that is available on the other detail screens.

To access this screen, press the F8 key to view the Main screen, move the cursor to the Number field and press the F7 key. The following fields must be filled before PRIMAN can process this request.

```
Request Number
Request Type
Resource
Attribute
Report Style
Data File
Report File
Report Device
```

The fields on this screen are listed and explained below.

Request Number contains the number of the PRIMAN request. To fill in this field, press the F1 key. The message "New Request Created..." appears and the Request Number field now contains the next sequential request number. This field has no auto-select options. If you had pressed the F5 key, the following message would appear.

There is no automatic selection for this field. Use the create function key to generate a new request.

Request Type specifies whether PRIMAN is to conduct a system-wide or per-user analysis of data. This field also appears in the Main screen that was presented earlier in this chapter. Pressing the F5 key when the cursor is in this field results in the following auto-select message.

```
-----
| These are the possible selections for this field. |
| Point to an item and press <ENTER> to select it; |
| It will be filled in for you automatically.      |
| Press <CANCEL> to do nothing.                    |
|                                                    |
| 1: SYSTEM oriented analysis                      |
| 2: USER   oriented analysis                      |
|                                                    |
|-----
```

To fill in this field, either use the auto-select feature or type the word SYS or USER.

Request Details

Request Type	:SYS	Objects:	Request Number: 1
Resource	:SYS-CPU	+-----+	
Attribute	:%cpu		
Scale Range	: to		
Axis Label	:		
		+-----+	
Report Style	:HISTOGRAM	Title Page	:
Report Header	:		
Data File	:<MYMFD>MYUFD>SAMPLES>SF022687		
Report File	:<MYMFD>MYUFD>SAMPLES>HISTO22787		
Sample Factor	:		
Window Type	:	+-----+	+-----+
	from:		
Report Device	:PTX		
Destination	:		
Copies	:1	+-----+	+-----+
Form Type	:		

This is the complete request. When filled out, it may be processed.
<F1-5> = PRIMAN Functions <F6> = MENU <F8> = ZOOM-OUT

Request Details Screen
Figure 5-3

Resource specifies the system resource that PRIMAN is to analyze. This field also appears in the Main screen and the Resource Details screen; both are presented in this chapter. Pressing the F5 key when the cursor is in this field results in the following auto-select message when your request type is SYS (system).

```

-----
| Point to an item and press <ENTER> to select it |
| Press <CANCEL> to do nothing.                  |
|                                                  |
| 1: SYS-CPU                                     |
| 2: SYS-IO                                      |
| 3: SYS-LOCATE                                  |
| 4: SYS-MEMORY                                  |
| 5: SYS-CONTRLR                                 |
| 6: SYS-DISK                                    |
| 7: SYS-ACTIVE                                 |
|                                                  |
-----

```

If your request type is USER, the following message will appear when you press the F5 key.

```

-----
| Point to an item and press <ENTER> to select it |
| Press <CANCEL> to do nothing.                  |
|                                                  |
| 1: USER-MEM                                   |
| 2: USER-CPU                                   |
| 3: USER-IO                                    |
|                                                  |
-----

```

To fill in the Resource field, either use the auto-select feature or type the resource name as it appears in the message above.

Attribute is the aspect of the resource to be analyzed by PRIMAN. Pressing the F5 key when the cursor is in this field results in an auto-select message. The contents of this message vary according to the resource and report style chosen. A sample auto-select message appears below when the resource specified is SYS-CPU.

```

-----
| Point to an item and press <ENTER> to select it      |
| Press <CANCEL> to do nothing.                        |
|                                                       |
| 1: CPU Utilisation                                   |
| 2: ISU 1 Idle                                       |
| 3: ISU 2 Idle                                       |
| 4: CPU-Disk Overlap                                 |
| 5: CPU Util. Error                                 |
| 6: Clock Overhead                                  |
| 7: Frontstop Overhead                              |
| 8: Amlc Overhead                                   |
| 9: Mpc Overhead                                    |
| 10: PNC Overhead                                   |
| 11: Smlc Overhead                                  |
| 12: Ics Overhead                                   |
| 13: Gppi Overhead                                  |
| 14: Async. Overhead                                |
| 15: Sync. Overhead                                 |
| 16: Disk Driver Overhead                           |
|                                                       |
-----

```

To fill in this field, either use the auto-select feature or type the attribute name as it appears (in parentheses) in the tables at the end of Chapter 4.

Objects are user names, controller numbers, or disk numbers when those orientations or resources are specified in other fields. All numbers must be in decimal format. Leaving this field blank generates reports for all users, controllers, or disks. This field has no auto-select feature.

Scale Range is optional. It may be used to override the default scale range. Pressing the F5 key when the cursor is in this field results in the following auto-select message.

```

-----
| This is the default value for the range "from" value. |
| Press <ENTER> to select it; or <CANCEL> to do nothing. |
|                                                       |
| 1: 0                                                    |
|                                                       |
-----

```

Pressing the F5 key when the cursor is in the "to" field results in the following auto-select message.

```

-----
| This is the default value for the range "to" value.  |
| Press <ENTER> to select it; or <CANCEL> to do nothing. |
|                                                       |
| 1: 1000                                                |
|                                                       |
-----

```

Axis Label is optional. It may be used to supply a label for the report axis. This field has no auto-select options. If you had pressed the F5 key, the following message would appear.

```

-----
| There is no automatic selection for this field. |
| You may enter a label for the x-axis.          |
| Press <ENTER> or <CANCEL> to continue.         |
-----

```

Report Style states which type of report is to be generated. This field also appears in the Main screen and in the Report Details screen; both are presented in this chapter. Pressing the F5 key when the cursor is in this field results in the following auto-select message.

```

-----
| These are the possible selections for this field. |
| Point to an item and press <ENTER> to select it;  |
| It will be filled in for you automatically.      |
| Press <CANCEL> to do nothing.                    |
|                                                    |
| 1: CHART          style report                    |
| 2: COMPARATOR    style report                    |
| 3: STATISTICS    style report                    |
| 4: HISTOGRAM     style report                    |
|                                                    |
-----

```

To fill in this field, either use the auto-select feature or type the report type as it appears in the above message. These report types are described below:

- o Charts show an attribute's number of units for each sampled clock time. The chart itself ranges from 0 to some maximum number of units, such as 0-100 for CPU utilization or 0-60 for page fault rate.
- o Comparitors show comparisons of the values of an attribute for a group of objects, such as comparing the CPU utilization for each user or the controller utilization for each controller.
- o Tables of statistics provide the mean, minimum, and maximum in the stated units for the entire sampling period for the items being analyzed by PRIMAN.
- o Histograms show the number and percent of samples that fall into each subdivision of the range of values; this range can be, for example, 0-100 for CPU utilization and 0-60 for page fault rate. The cumulative percent of observations is also provided. The graph itself differentiates between the percent of observations for a particular subdivision and the cumulative percent.

Title Page is optional and suppresses the printing of the PRIMAN header page when you type NO. Pressing the F5 key when the cursor is in this field results in the following auto-select message.

```

-----
| These are the possible selections for this field. |
| Point to an item and press <ENTER> to select it; |
| It will be filled in for you automatically.      |
| Press <CANCEL> to do nothing.                    |
|                                                    |
| 1: Prepare report WITH a title page              |
| 2: Prepare report WITH NO title page             |
-----

```

To fill in this field, either use the auto-select feature or type the words YES or NO.

Report Header is optional. It is the line that PRIMAN will place at the top of each report page. This field has no auto-select options. If you had pressed the F5 key, the following message would appear.

```

-----
| There is no automatic selection available for this field. |
| Enter a line of descriptive text for the report, if desired. |
|                                                    |
-----

```

Press the ENTER or CANCEL key to continue.

Data File is the pathname of the PRIMON file to be analyzed. This field has no auto-select options. If you had pressed the F5 key, the following message would appear.

```

-----
| There is no automatic selection for this field. |
| You must enter the pathname of your data file. |
| Press <ENTER> or <CANCEL> to continue.          |
-----

```

Report File is the pathname of the PRIMAN report to be generated by this request. For user, controller, or disk reports, specify a separate report file pathname for each user, controller, or disk drive. This field has no auto-select options. If you had pressed the F5 key, the following message would appear.

```

-----
| There is no automatic selection for this field. |
| You must enter the pathname you want for your report file. |
| Press <ENTER> or <CANCEL> to continue.          |
-----

```

Sample Factor is optional. It reduces the report size by processing every nth sample of the PRIMON file, instead of every sample. Pressing the F5 key when the cursor is in this field results in the following auto-select message.

```

-----
| This is the default selection for this field. |
| Press <ENTER> to select it; |
| It will be filled in for you automatically. |
| Press <CANCEL> to do nothing. |
| |
| 1: Default sample factor is 1 (one) |
-----

```

To fill in this field, either use the auto-select feature or type the desired sample factor number.

Window Type is optional, and is used in combination with the Windows field. The two types of windows are INC (inclusive) and AVE (average). The inclusive window type analyzes only the data within the pairs of dates specified in the boxes for the Windows. The average window type is used to generate a report for an average day when data has been collected over several days. This is done by calculating the average value of each sample in a day. For example, all 9:15 a.m. values are averaged, then all 10:00 a.m. values, and so on.

Pressing the F5 key when the cursor is in this field results in the following auto-select message.

```

-----
| These are the possible selections for this field. |
| Point to an item and press <ENTER> to select it; |
| It will be filled in for you automatically. |
| Press <CANCEL> to do nothing. |
| |
| 1: INClusive window (start to finish) |
| 2: AVErage window (averages over period) |
-----

```

To fill in this field, either use the auto-select feature or type the desired window type INC or AVE.

Entering information in the boxes for the windows is optional, and is used in combination with the Window Type field. This reduces the report size by processing only those samples that were taken between a specified pair of dates/times. This is valuable for analyzing peak period data. The format of the windows is as follows:

mm/dd/yy.hh:mm:ss

to represent month, day, year, hour, minute, second. The time is specified based on a 24-hour clock.

Report Device specifies the type of printer to be used in spooling the report -- a Printronix graphics printer or a line printer. This field also appears in the Main screen and the Report Device Details screen; both are presented later in this chapter. Pressing the F5 key when the cursor is in this field results in the following auto-select message.

```

-----
| These are the possible selections for this field. |
| Point to an item and press <ENTER> to select it; |
| It will be filled in for you automatically.      |
| Press <CANCEL> to do nothing.                    |
|                                                    |
| 1: LinePrinter output report                     |
| 2: PrinTroniX output report                      |
-----

```

To fill in this field, either use the auto-select feature or type the abbreviations PTX or LPR in the Device field.

Destination specifies the spooling location. This field has no auto-select feature. If you had entered LPR as the spooling device, your spooling location must have a line printer with 132-column wide paper loaded in it. If you entered PTX as the spooling device, your spooling location must have a Printronix printer with paper loaded in it.

Copies are optional, specifying the number of copies to spool. The default value is 1; 0 suppresses spooling. Pressing the F5 key when the cursor is in this field results in the following auto-select message.

```

-----
| This is the default selection for this field.    |
| Press <ENTER> to select it;                      |
| It will be filled in for you automatically.      |
| Press <CANCEL> to do nothing.                    |
|                                                    |
| 1: Default number of spool copies is 1 (one)     |
-----

```

To fill in this field, either use the auto-select feature or type the desired number of copies.

Form Type specifies the paper type to be used when spooling the report. This field has no auto-select feature. PRIMAN reports spooled to line printers require 132-column paper. Therefore, if you had entered LPR in the Device field, you should enter the word WIDE in this field to ensure that only a line printer loaded with 132-column paper will receive the PRIMAN report.

After completing your PRIMAN report request, you can perform one of the following PRIMAN functions listed below.

- o Create a new processing request
- o Process the current requests
- o Save requests to a PRIMOS file
- o Read requests from PRIMOS file
- o Auto selection of field options

Each of these functions is described in this chapter.

THE RESOURCE DETAILS SCREEN

This display, shown in Figure 5-4 with a sample request, contains the request fields relating to the resource to be analyzed by PRIMAN. All fields on this screen also appear in the Request Details screen. The Resource Details screen, however, contains help information. To access this screen, press the F8 key to view the Main screen, move the cursor to the Resource field, and press the F7 key. The following fields on this screen must be filled before PRIMAN can process this request.

Resource
Request Type
Attribute

Each field is listed and described below.

Resource specifies the system resource that PRIMAN is to analyze. Pressing the F5 key when the cursor is in this field results in the following auto-select message when your request type is SYS (system).

```

-----
| Point to an item and press <ENTER> to select it |
| Press <CANCEL> to do nothing.                  |
|                                                  |
| 1: SYS-CPU                                     |
| 2: SYS-IO                                      |
| 3: SYS-LOCATE                                  |
| 4: SYS-MEMORY                                  |
| 5: SYS-CONTRLR                                 |
| 6: SYS-DISK                                    |
| 7: SYS-ACTIVE                                  |
|                                                  |
-----

```

If your request type is USER, the following message will appear when you press the F5 key.

```

-----
| Point to an item and press <ENTER> to select it |
| Press <CANCEL> to do nothing.                  |
|                                                  |
| 1: USER-MEM                                    |
| 2: USER-CPU                                    |
| 3: USER-IO                                     |
|                                                  |
-----

```

To fill in the Resource field, either use the auto-select feature or type the resource name as it appears in the message above.

Resource Details

Resource: SYS-CPU Request Type: SYS
Attribute: %cpu Axis Label:
 Scale Range: to

Objects: +-----+
 | |
 | |
 | |
 +-----+

This is the resource details screen. Fill in the details of the resource to be analysed, together with the attribute of interest. If a list of objects is required fill them in as well, otherwise leave the objects field blank. The axis label may be used to place your own text on the vertical axis of the charts and graphs. Similarly the default range on the axis may be changed by filling in the scale range fields. To accept the defaults leave these blank.

 <F1-5> = PRIMAN Functions <F6> = MENU <F8> = ZOOM-OUT

Resource Details Screen
Figure 5-4

Request Type specifies whether PRIMAN is to conduct a system-wide or per-user analysis of data. This field also appears in the Request Details screen that is presented later in this chapter. Pressing the F5 key when the cursor is in this field results in the following auto-select message.

```

-----
| These are the possible selections for this field. |
| Point to an item and press <ENTER> to select it; |
| It will be filled in for you automatically.      |
| Press <CANCEL> to do nothing.                    |
|                                                    |
| 1: SYSTEM oriented analysis                      |
| 2: USER   oriented analysis                      |
-----

```

To fill in this field, either use the auto-select feature or type the words SYS or USER.

Attribute is the aspect of the resource to be analyzed by PRIMAN. Pressing the F5 key when the cursor is in this field results in an auto-select message. The contents of this message vary according to the Resource and Report Style chosen. A sample auto-select message appears below when the resource specified elsewhere is CPU.

```

-----
| Point to an item and press <ENTER> to select it |
| Press <CANCEL> to do nothing.                  |
|                                                    |
| 1: CPU Utilisation                               |
| 2: ISU 1 Idle                                   |
| 3: ISU 2 Idle                                   |
| 4: CPU-Disk Overlap                             |
| 5: CPU Util. Error                              |
| 6: Clock Overhead                               |
| 7: Frontstop Overhead                           |
| 8: Amlc Overhead                                |
| 9: Mpc Overhead                                 |
| 10: PNC Overhead                                |
| 11: Smlc Overhead                               |
| 12: Ics Overhead                                |
| 13: Gppi Overhead                              |
| 14: Async. Overhead                             |
| 15: Sync. Overhead                             |
| 16: Disk Driver Overhead                       |
-----

```

To fill in this field, either use the auto-select feature or type the attribute name as it appears (in parentheses) in the tables at the end of Chapter 4.

Axis Label is optional. It may be used to supply a label for the

report axis. This field has no auto-select options. If you had pressed the F5 key, the following message would appear.

```

-----
| There is no automatic selection for this field. |
| You may enter a label for the x-axis.          |
| Press <ENTER> or <CANCEL> to continue.         |
-----

```

Scale Range is optional. It may be used to override the default scale range. Pressing the F5 key when the cursor is in this field results in the following auto-select message.

```

-----
| This is the default value for the range "from" value. |
| Press <ENTER> to select it; or <CANCEL> to do nothing. |
|                                                       |
| 1: 0                                                  |
-----

```

Pressing the F5 key when the cursor is in this field results in the following auto-select message.

```

-----
| This is the default value for the range "to" value. |
| Press <ENTER> to select it; or <CANCEL> to do nothing. |
|                                                       |
| 1: 1000                                              |
-----

```

Objects are user names, controller numbers, or disk numbers when those orientations or resources are specified in other fields. All numbers must be in decimal format. Leaving this field blank generates reports for all users, controllers, or disks. This field has no auto-select feature.

THE REPORT DETAILS SCREEN

This display, shown in Figure 5-5 with a sample request, contains the request fields relating to the report to be generated by PRIMAN. All of the fields on this screen also appear in the Request Details screen. The Report Details screen, however, contains help information. To access this screen, press the F8 key to view the Main screen, move the cursor to the Report Style field, and press the F7 key. The following fields in this screen must be filled before PRIMAN can process this request.

Report Style
Data File
Report File

Each field is listed and describe below.

Report Style states the type of report to be generated. Pressing the F5 key when the cursor is in this field results in the following auto-select message.

```

-----
| These are the possible selections for this field. |
| Point to an item and press <ENTER> to select it; |
| It will be filled in for you automatically.      |
| Press <CANCEL> to do nothing.                    |
|                                                    |
| 1: CHART          style report                    |
| 2: COMPARITOR     style report                    |
| 3: STATISTICS     style report                    |
| 4: HISTOGRAM      style report                    |
|                                                    |
-----

```

To fill in this field, either use the auto-select feature or type the report type as it appears in the above message. These report types are described below:

- o Charts show an attribute's number of units for each sampled clock time. The chart itself ranges from 0 to some maximum number of units, such as 0-100 for CPU utilization or 0-60 for page fault rate.
- o Comparitors show comparisons of the values of an attribute for a group of objects, such as comparing the CPU utilization for each user or the controller utilization for each controller.
- o Tables of statistics provide the mean, minimum, and maximum in the stated units for the entire sampling period for the items being analyzed by PRIMAN.

Report Details

Report Style : HISTOGRAM
Data File : <MYMFD>MYUFD>SAMPLES>SF022687
Report File : <MYMFD>MYUFD>REPORTS>HIST0022787
Report Header : Title Page:

Window Type :	Window Start	Window End
	+-----+	+-----+
Sample Factor :		
	+-----+	+-----+

This is the report details screen. Fill in the information needed to produce the report. The data (condensed) filename MUST be specified, as must the report filename. If windowing is not required, leave the fields blank. If a sample factor is required, enter a positive integer, otherwise leave blank.

<F1-5> = PRIMAN Functions <F6> = MENU <F8> = ZOOM-OUT

Report Details Screen
Figure 5-5

- o Histograms show the number and percent of samples that fall into each subdivision of the range of values; this range can be, for example, 0-100 for CPU utilization and 0-60 for page fault rate. The cumulative percent of observations is also provided. The graph itself differentiates between the percent of observations for a particular subdivision and the cumulative percent.

Title Page is optional and suppresses the printing of the PRIMAN header page when you type NO. Pressing the F5 key when the cursor is in this field results in the following auto-select message.

```

-----
| These are the possible selections for this field. |
| Point to an item and press <ENTER> to select it; |
| It will be filled in for you automatically.      |
| Press <CANCEL> to do nothing.                    |
|                                                    |
| 1: Prepare report WITH a title page              |
| 2: Prepare report WITH NO title page             |
-----

```

To fill in this field, either use the auto-select feature or type the words YES or NO.

Data File is the pathname of the PRIMON file to be analyzed. This field has no auto-select options. If you had pressed the F5 key, the following message would appear.

```

-----
| There is no automatic selection for this field. |
| You must enter the pathname of your data file. |
| Press <ENTER> or <CANCEL> to continue.          |
-----

```

Report File is the pathname of the PRIMAN report to be generated by this request. For user, controller, or disk reports, specify a separate report file pathname for each user, controller, or disk drive. This field has no auto-select options. If you had pressed the F5 key, the following message would appear.

```

-----
| There is no automatic selection for this field. |
| You must enter the pathname you want for your report file. |
| Press <ENTER> or <CANCEL> to continue.          |
-----

```

Report Header is optional. It is the line that PRIMAN will place at the top of each report page. This field has no auto-select options. If you had pressed the F5 key, the following message would appear.

```

-----
| There is no automatic selection available for this field. |
| Enter a line of descriptive text for the report, if desired. |
|-----

```

Press the ENTER or CANCEL key to continue.

Window Type is optional, and is used in combination with the Windows field. The two types of windows are INC (inclusive) and AVE (average). The inclusive window type analyzes only the data within the pairs of dates specified in the boxes for the Windows. The average window type is used to generate a report for an average day when data has been collected over several days. This is done by calculating the average value of each sample in a day. For example, all 9:15 a.m. values are averaged, then all 10:00 a.m. values, and so on.

Pressing the F5 key when the cursor is in this field results in the following auto-select message.

```

-----
| These are the possible selections for this field. |
| Point to an item and press <ENTER> to select it; |
| It will be filled in for you automatically. |
| Press <CANCEL> to do nothing. |
|-----
|
| 1: INClusive window (start to finish) |
| 2: AVERage window (averages over period) |
|-----

```

To fill in this field, either use the auto-select feature or type the desired window type INC or AVE.

Window Start and Window End are optional, and are used in combination with the Window Type field. This reduces the report size by processing only those samples that were taken between a specified pair of dates/times. This is valuable for analyzing peak period data. The format of the windows is as follows:

mm/dd/yy.hh:mm:ss

to represent month, day, year, hour, minute, second. The time is specified based on a 24-hour clock.

Sample Factor is optional. It reduces the report size by processing every nth sample of the PRIMON file, instead of every sample. Pressing the F5 key when the cursor is in this field results in the following auto-select message.

```
-----  
| This is the default selection for this field. |  
| Press <ENTER> to select it; |  
| It will be filled in for you automatically. |  
| Press <CANCEL> to do nothing. |  
| |  
| 1: Default sample factor is 1 (one) |  
-----
```

To fill in this field, either use the auto-select feature or type the desired sample factor number.

THE REPORT DEVICE DETAILS SCREEN

This display, shown in Figure 5-6 with a sample request, contains the request fields relating to the Report Device that is to print the PRIMAN request. All of the fields on this screen also appear in the Request Details screen. The Report Device Details screen, however, contains help information. To access this screen, press the F8 key to view the Main screen, move the cursor to the Device field, and press the F7 key. The following field in this screen must be filled before PRIMAN can process this request.

Report Device

Each field is listed and described below.

Report Device specifies the type of printer to be used in spooling the report -- a Printronix graphics printer or a line printer. Pressing the F5 key when the cursor is in this field results in the following auto-select message.

```

-----
| These are the possible selections for this field. |
| Point to an item and press <ENTER> to select it; |
| It will be filled in for you automatically.      |
| Press <CANCEL> to do nothing.                    |
|                                                    |
| 1: LinePrinter output report                     |
| 2: PrinTroniX output report                      |
|                                                    |
-----

```

To fill in this field, either use the auto-select feature or type the abbreviations PTX or LPR in the Device field.

Spooler Destination specifies the spooling location. This field has no auto-select feature. If you had entered LPR as the spooling device, your spooling location must have a line printer with 132-column wide paper loaded in it. If you entered PTX as the spooling device, your spooling location must have a Printronix printer with paper loaded in it.

Number of Copies is optional, specifying the number of copies to spool. The default value is 1; 0 suppresses spooling.

Pressing the F5 key when the cursor is in this field results in the following auto-select message.

```
-----
| This is the default selection for this field. |
| Press <ENTER> to select it;                  |
| It will be filled in for you automatically.  |
| Press <CANCEL> to do nothing.                 |
|                                               |
| 1: Default number of spool copies is 1 (one)  |
|                                               |
|-----
```

To fill in this field, either use the auto-select feature or type the desired number of copies.

Spooler Form Type specifies the paper type to be used when spooling the report. This field has no auto-select feature. PRIMAN reports spooled to line printers require 132-column paper. Therefore, if you had entered LPR in the Device field, you should enter the word WIDE in this field to ensure that only a line printer loaded with 132-column paper will receive the PRIMAN report.

Report Device Details

Report Device : PTX

Spooler Destination :

Number of Copies : 1

Spooler Form Type :

This is the report details screen. Fill in the information needed to send the report to the appropriate printer. If no special destination or form type is required, leave the fields blank. The number of copies must be a positive integer, otherwise the default of one copy will be spooled. An entry of zero will suppress printing of the report file.

<F1-5> = PRIMAN Functions <F6> = MENU <F8> = ZOOM-OUT

Report Device Details Screen
Figure 5-6

PROCESSING CURRENT REQUESTS

The current PRIMAN requests are those that appear on the Main screen. You may view the major fields of these requests in the Main screen or see each request by pressing the F7 key in the Number field of each one in that screen.

To process the current requests, press the F2 key. Alternatively, you can select this function by pressing the F6 key, moving the cursor to the "Process the current requests" entry, and pressing the ENTER key. The following messages appear in this order.

Executing your requests...
Request processor invoked.

At this point, you may press the F8 key (from the Main screen) to return to the PRIMOS level.

SAVING REQUESTS TO A PRIMOS FILE

To save the current requests to a PRIMOS file, press the F3 key. Alternatively, you can select this function by pressing the F6 key, moving to cursor to the "Save requests to a PRIMOS file" entry, and pressing the ENTER key. The following message appears.

What is the filename?

Enter the desired filename or treename. The following message appears.

Saving your requests to filename.

READING REQUESTS FROM A PRIMOS FILE

To read PRIMAN requests from a PRIMOS file, press the F4 key. Alternatively, you can select this function by pressing the F6 key, moving the cursor to the "Read requests from PRIMOS file" entry, and pressing the ENTER key. The following message appears.

What is the filename?

Enter the desired filename. The following message appears.

Reading requests from filename.

The Main screen now contains the read-in requests.

DELETING PRIMAN REQUESTS

To delete a PRIMAN request, move the cursor to the request on the Main screen that you wish to delete and press the DELETE key (DLINE key for PT45 users). The request disappears and the requests are renumbered.

EXITING PRIMAN TO THE PRIMOS LEVEL

When you wish to leave PRIMAN, press the F8 key from the Main screen. You will be returned to PRIMOS level if all of your PRIMAN requests have either been executed or saved to a file. Otherwise, the following message appears.

```
-----  
| Your requests have not been saved. OK to quit? |  
-----
```

Press N (and RETURN) if you do not wish to quit before you save your requests. Save them as noted in section SAVING REQUESTS TO A PRIMOS FILE which appears earlier in this chapter. Then press the F8 key again to return to PRIMOS level.

Press Y (and RETURN) if you do not wish to save your PRIMAN requests. The PRIMAN screen vanishes and you are returned to PRIMOS level.

CHAPTER 6

READING AND INTERPRETING THE REPORTS

PRIMAN produces four types of report formats as listed below.

- o Chart
- o Comparitor
- o Histogram
- o Statistics

These reports can have either of the following orientations:

- o System Basis
- o User Basis

Each report has a report header that gives the following information:

- o Report type
- o System or user request type
- o Attribute
- o Starting date and time of sampling period
- o Ending date and time of sampling period

- o Unit used in measuring the attribute
- o Mean, minimum, and maximum measurements of the attribute

A sample PRIMAN report header appears in Figures 6-1 and 6-2.

```

                                PRIMAN Chart of
                                CPU Utilization

                                Data for System

Sample Interval From  85-05-03.10:00:00.Fri To  85-05-03.10:45:00.Fri

                                Attribute Statistics
                                -----
Attribute                unit      mean  minimum  maximum
-----
CPU Utilization          %        30.46    15.22    54.98
  
```

Sample PRIMAN Report Header from Line Printer
Figure 6-1

PRIMAN

Chart of System CPU Utilization for ENV For System ENV cpu type 9955-II

Sample Interval From 87-04-28.12:54:30.Tue to 87-04-29.12:51:26.Wed

Attribute Statistics

attribute	unit	mean	minimum	maximum
CPU Utilisation	%	92.98	87.16	93.79

Sample PRIMAN Report Header from Printronix Printer
Figure 6-2

READING A CHART REPORT

The chart report is a graphic representation of how a particular attribute varies over time during the sample period or window. The right column gives the time of the measurement, and the left column gives the actual measured value at that time. The graphical line is drawn with its length proportional to the measured value. Values that are too large to fit onto the chart are represented by right angle brackets (››); values that are too small but are non-zero are shown by left angle brackets (‹‹).

The chart, illustrated in Figures 6-3 and 6-4, allows you to see the variation of a resource attribute over a specified period of time. Thus, a chart report shows the times of such things as peak CPU load and heavy I/O utilization. This information is useful for load balancing, determining optimum times for batch runs, or suggesting when to upgrade an excessively loaded resource.

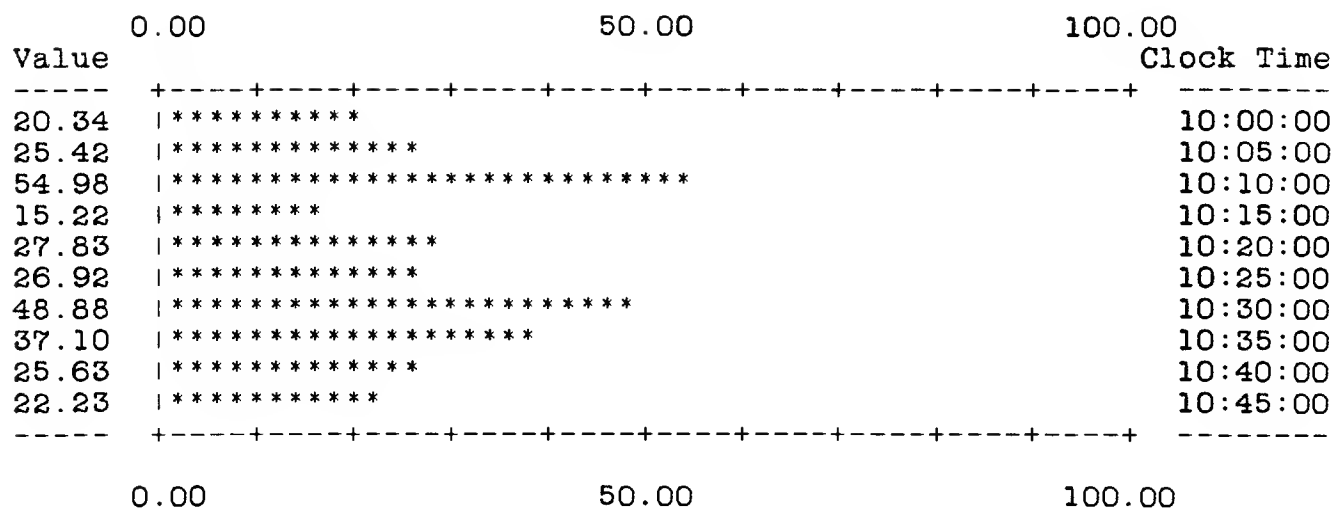


Figure 6-3
Sample Chart from Line Printer

%CPU Utilization

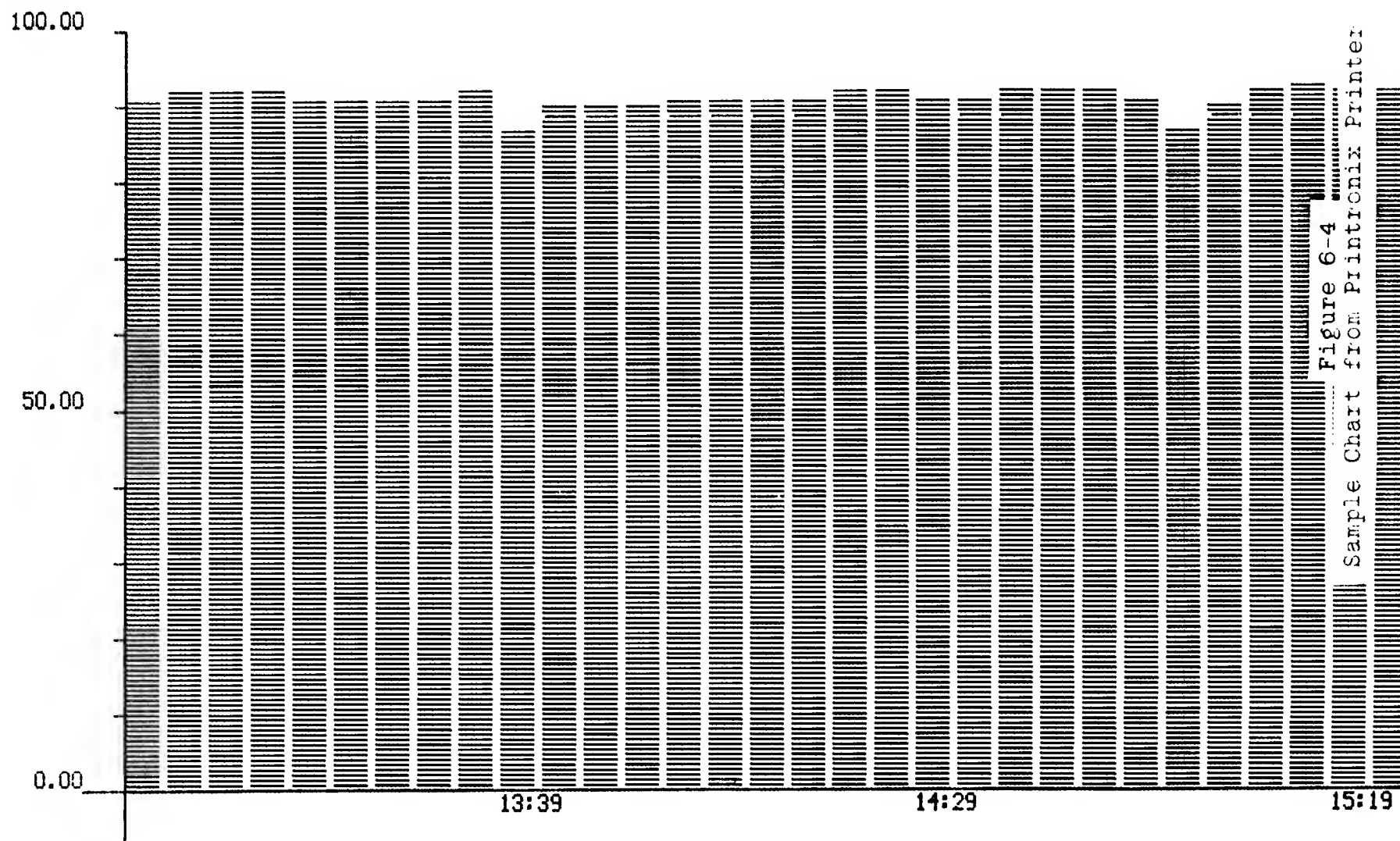


Figure 6-4 Sample Chart from Printronix Printer

READING A COMPARITOR REPORT

The comparator report (illustrated in Figures 6-5 and 6-6) shows the statistics for an attribute of a resource over a list of objects such as users, controllers, or disks. Thus, you can see the variation in the use of a resource by these objects. The statistics are represented by a line of asterisks (*) with a dash (-) in that line. The asterisks begin at the minimum value recorded for the object and continue to the maximum. The dash in the line of asterisks shows the mean value recorded for the object. In this way, the range and mean for each object are graphically shown. You can then make comparisons between objects for maximum, minimum, and means, as well as determine any asymmetry where the mean is nearer the minimum or the maximum.

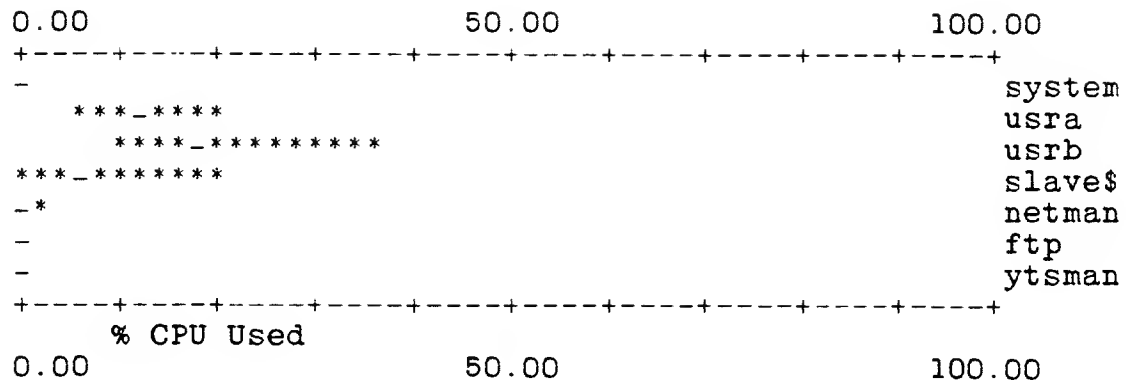


Figure 6-5
Sample Comparitor Report from Line Printer

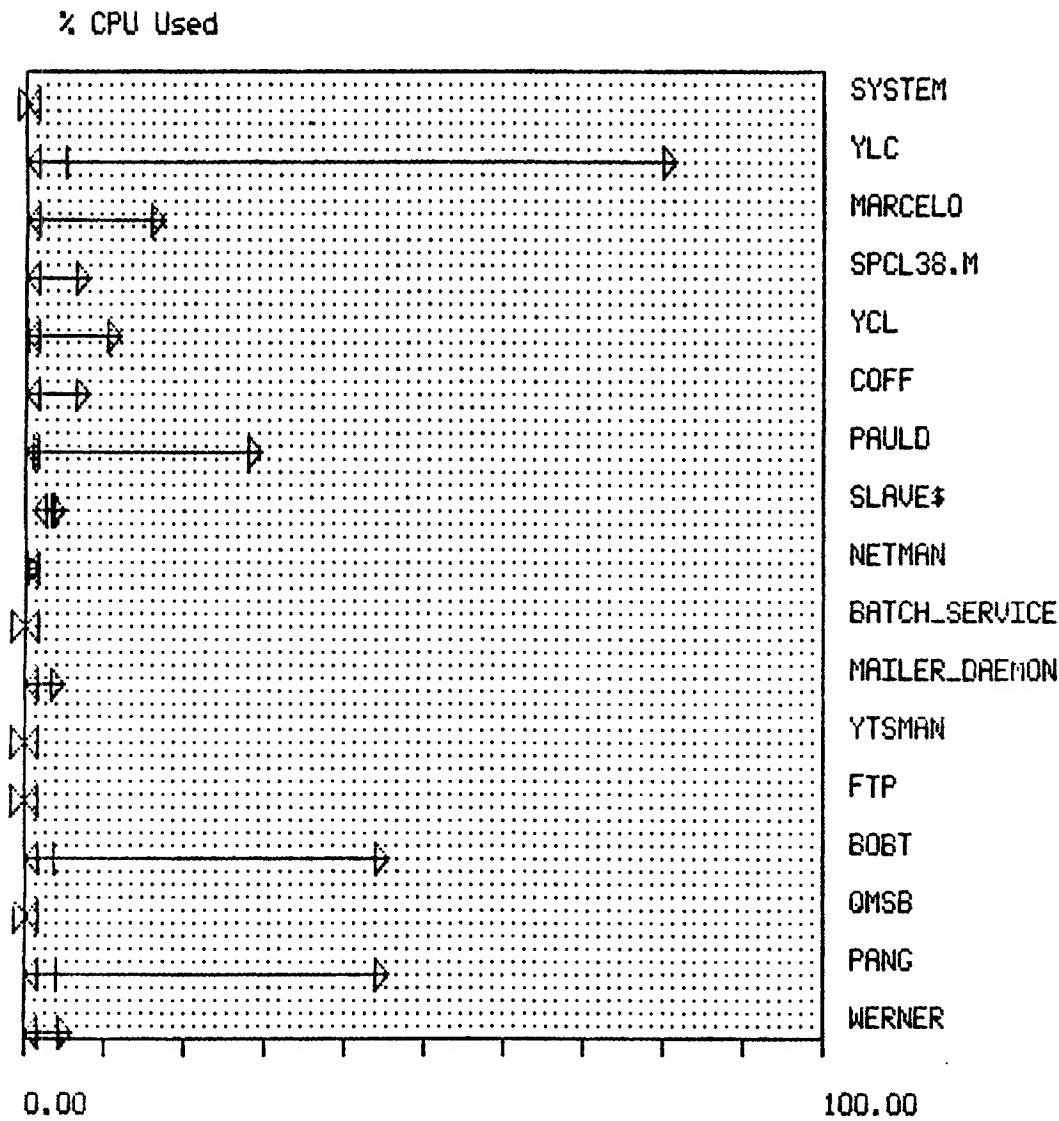


Figure 6-6
Sample Comparator Report from Printronix Printer

READING A HISTOGRAM REPORT

The histogram report presents the variation of an attribute over a specified period of time. (Figures 6-7 and 6-8 are sample histograms.) The histogram scale is divided into a series of slots for the measurements of the attribute, with the minimum value of the slot shown in the Value (from) column at the left of the histogram. Thus, 10.00 in the Value column means that this slot contains measurements that fall in the 10.00 to 10.99 range.

The measurements are totaled based on which slot in the histogram scale they fit into. The Obs # column contains the number of measurements that fell into each slot, while the Obs % column expresses each number as a percent of the total number of measurements taken. The histogram bars drawn with plus signs (+) graphically show the Obs % value for each slot. A histogram allows you to see which values are the most common and how the measured values are spread out across the possible range of values. This information is useful, for example, in identifying the most usual page fault value or the usual CPU load.

The Cum % column contains the number of all measurements from 0 through the current slot, expressed as a percent of the total number of measurements taken. This information is useful to find out things like what percentage of measured values are greater than a given value. This cumulative percentage is graphically shown in the histogram by O's.

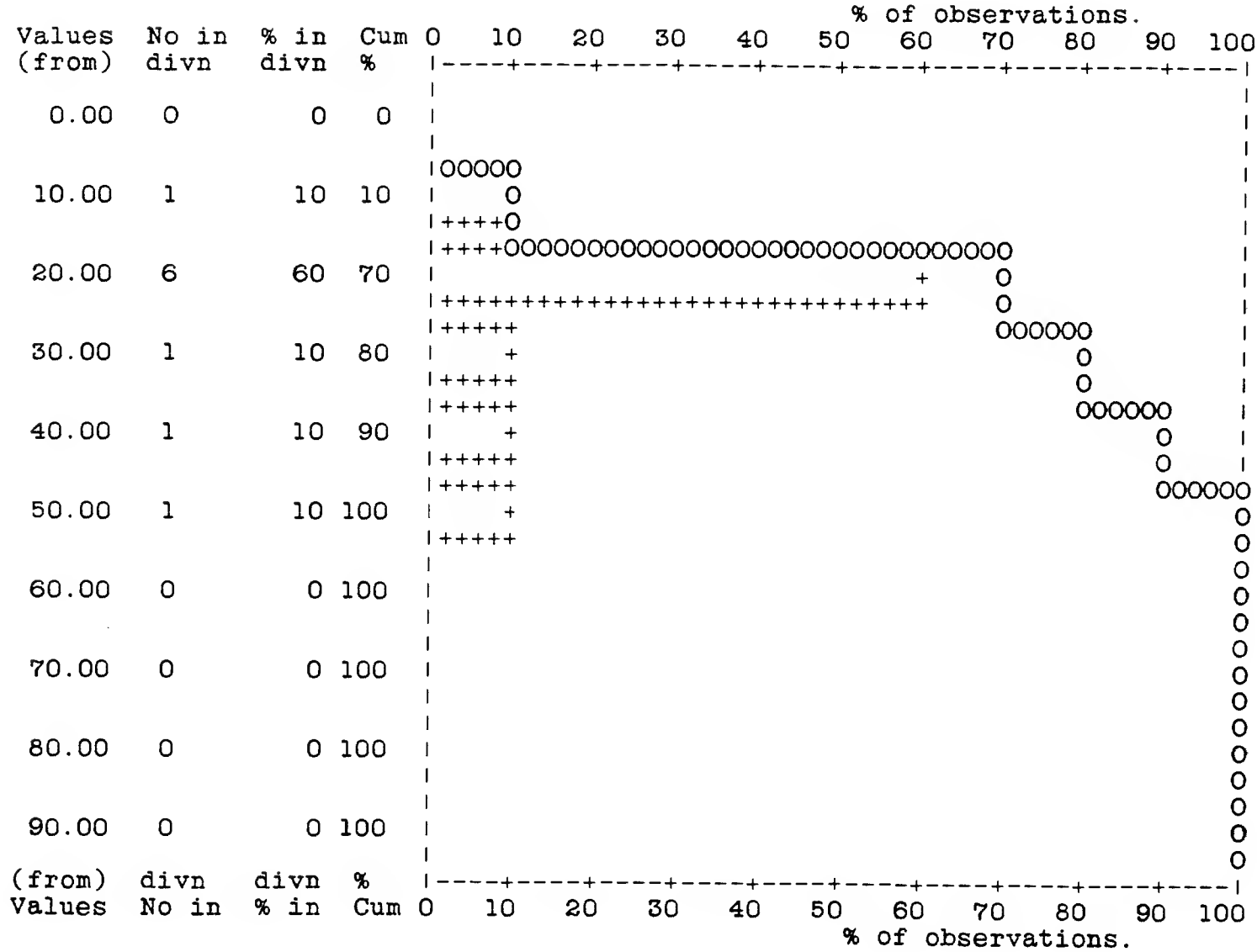
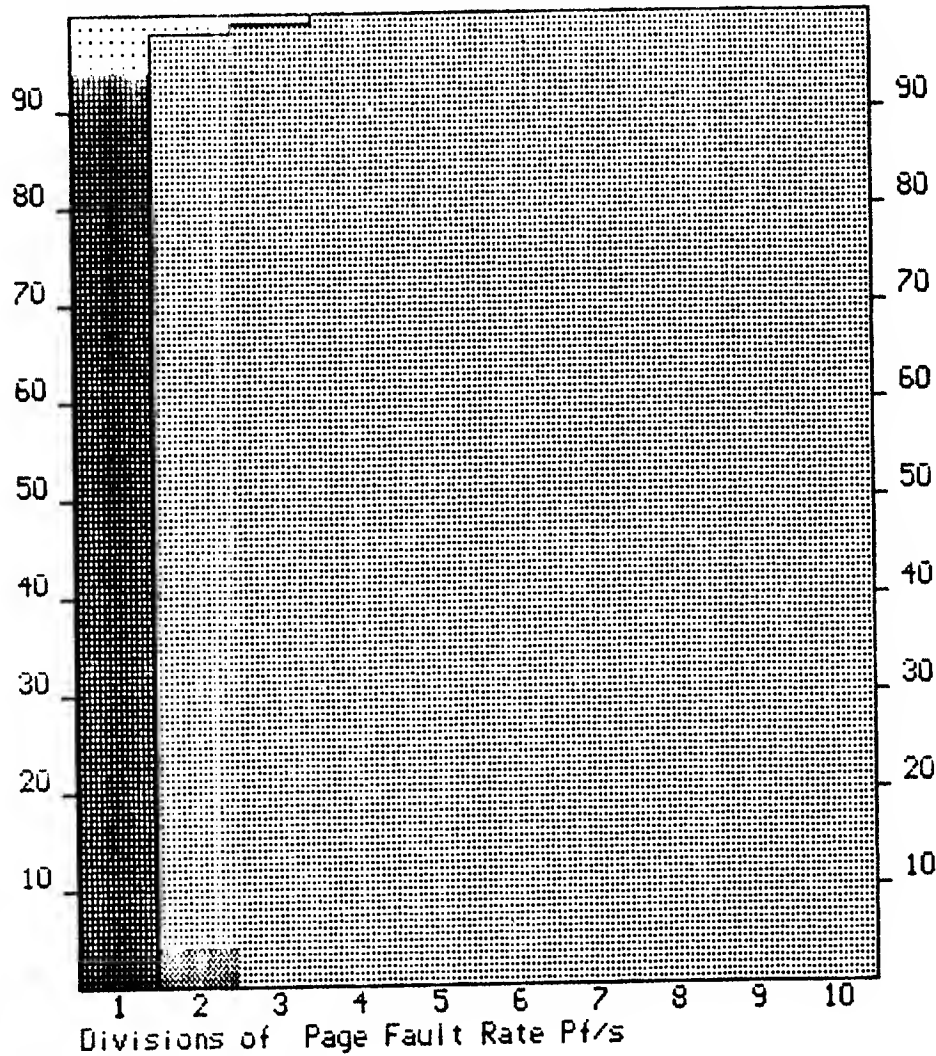


Figure 6-7
Sample Histogram from Line Printer

PRIMAN Histogram of Page Fault Rate

Page Faults/Sec



Divisions of Page Fault Rate Pf/s

Division#	Division Boundaries	Number in div	Percent in div	Cumulative%
1	0.0 - 5.9	272	94	94
2	6.0 - 11.9	12	4	99
3	12.0 - 17.9	2	1	99
4	18.0 - 23.9	2	1	100
5	24.0 - 29.9	0	0	100
6	30.0 - 35.9	0	0	100
7	36.0 - 41.9	0	0	100
8	42.0 - 47.9	0	0	100
9	48.0 - 53.9	0	0	100
10	54.0 - 59.9	0	0	100

Range 0.00 to 60.00
total samples = 288

Figure 6-8
Sample Histogram from Printtronix Printer

READING A STATISTICS REPORT

The statistics report (illustrated in Figure 6-9) presents the mean and range statistics for a resource attribute over a specified period of time.

Regardless of the resource attribute selected, all system-based statistics reports contain mean and range statistics for the following:

- o CPU utilization
- o I/O utilization
- o I/O Rate
- o Page fault rates

For per-user reports, all statistics reports contain mean and range statistics for the following:

- o CPU time and utilization
- o I/O time and utilization
- o Pages used and wired
- o Segments used

Thus, statistics reports contain much information in a single page that is of particular value when you are beginning the analysis of the activity on a system. More information on this appears in Chapter 4 in the section STRATEGY FOR ANALYZING A SYSTEM FOR BOTTLENECKS.

```

*****
*   Attribute           *   Unit   *   Mean   *   Minimum *   Maximum *
*****
*   Locate Miss Rate    *   LM/s  *   11.1767 *   2.2467  *   46.8400 *
*   CPU Utilization     *   %     *   38.1182 *   11.1807 *   86.8799 *
*   IO Utilization      *   %     *   16.8758 *   3.1333  *   41.9427 *
*   IO Rate             *   IO/s  *   14.7000 *   2.6800  *   51.7267 *
*   Page Fault Rate     *   Pf/s  *   6.3467  *   1.4233  *   12.5733 *
*****

```

Figure 6-9
Sample Statistics Report

CHAPTER 7

ENHANCING SYSTEM PERFORMANCE

If you are satisfied with the response time of your system, then there is no performance problem on your system. If, however, you feel that there may be performance problems, then you'll want to find out what the problems could be and how they may be fixed.

There are three major resources in any Prime system: the CPU, the disks, and memory. When any of these resources becomes a bottleneck, the system is CPU-bound, I/O-bound, or memory-bound. There may also be bottlenecks caused by excessive system processes overhead and semaphores or locks.

When the system is CPU-bound, it is trying to do so much CPU processing that the CPU system is saturated and has become a bottleneck.

When the system is I/O-bound, it is performing so much I/O that the I/O system has become a bottleneck. There are three basic ways that the system may become I/O-bound as listed below.

- o Excessive paging operations, where the system has to move so many pages in and out of memory so frequently that it has little time to do anything else. This situation is called thrashing.
- o Excessive file operations, where the file system does not find many of the records it needs in the associative (Locate) buffers and has to go out to the disk too frequently. (Locate is the file system associative buffer manager.) Locate buffers store the most recently and most frequently accessed disk records in memory, thus reducing disk I/O.

- o Unbalanced I/O, where the number of I/Os is not spread evenly among the controllers and disks.

Note

The symptoms of a system that is memory-bound are the same as one that is I/O bound. When a system is memory-bound, it will become I/O bound as well.

Through the symptoms presented in this chapter, you may identify the probable locations of the bottlenecks that are causing performance problems.

Note

If your system has a bottleneck, you will see one or more of the symptoms given in this chapter for that particular bottleneck type. You do not have to see every one of the symptoms listed for a particular bottleneck, however, to have a bottleneck in your system.

This chapter also tells how to alleviate the conditions in your system that are hurting performance. In these descriptions, there are many ways of solving performance problems for a given condition. You have to pick the one (or more) that is best for your system.

CAUTION

After you have changed something to alleviate a bottleneck, go through the PRIMON data collection procedure again as well as the PRIMAN report generation and interpretation phases. You must do this to be sure that the problem has been truly alleviated and has not inadvertently caused another problem.

PHASE 1 OF ANALYSIS

You may generate the following system reports before you may begin to analyze your system for possible bottlenecks:

- o Statistics for the SYS-LOCATE resource and the Locate Misses attribute. In addition to giving information about Locate Misses, all system statistics reports provide figures for CPU Utilization, IO Utilization, and Page Fault Rate.
- o Histogram for the SYS-CPU resource and the ISU 1 Idle attribute. (ISU means CPU. P6550 and P850 users may generate an additional histogram for ISU 2 Idle and analyze it as for ISU 1 Idle.)
- o Histogram for the SYS-IO resource and the IO Utilization attribute.
- o Histogram for the SYS-IO resource and the Page Fault Rate attribute.
- o Histogram for the SYS-LOCATE resource and the Locate Misses attribute.

The following sections tell how to use the first level reports to determine whether your system could have a bottleneck.

Examining the Locate Misses Statistics Report

In this Statistics Report, the following maximum values indicate possible bottlenecks.

Table 7-1
Analysis of Statistics Report for Locate Misses Attribute

Attribute	Maximum Value	Possible Bottleneck
CPU Utilization	80% or more	CPU
IO Utilization	85% or more for 1 controller 160% or more for 2 controllers	IO
Page Fault Rate	10/sec or more for models to 2655 20/sec or more for 9650 to 9955 II	IO only when IO Utilization indicates a possible bottleneck. See the note that appears below.
Locate Misses	15% or more	IO only when IO Utilization indicates a possible bottleneck

Note to Table 7-1

A high page fault may not always produce an I/O bottleneck. Rev. 19.4 or later software that uses EPFs (executable program format) may have a low IO Utilization even though the page fault rate may seem high. Excessive IO Utilization as defined above is the definitive symptom of an I/O bottleneck. (EPFs are produced by BIND.)

Examining the Histograms

If your Statistics Report indicates a possible bottleneck, you need to examine the appropriate Histogram to see if there were many occurrences of a possible bottleneck.

Table 7-2
Histogram Analysis for CPU or I/O Bottlenecks

Histogram	Values	Possible Meanings
ISU 1 Idle	0% to 9.99%	CPU bottleneck
	10% or more	No CPU bottleneck. Check IO Utilization for possible I/O bottleneck.
IO Utilization	80% or more for 1 controller	I/O bottleneck. Consult Table 7-3
	160% or more for 2 controllers	for a possible cause.

If you suspect that your system has an I/O bottleneck, you may examine the Page Fault Rate and Locate Misses Histograms. Table 7-3 tells how you may interpret these reports.

Table 7-3
Histogram Analysis for Possible Cause of I/O Bottleneck

Histogram	Values	Possible Meanings
Page Fault Rate	10/sec or more for models to 2655 20/sec or more for 9650 to 9955 II	I/O bottleneck is caused by excessive paging
Locate Misses	10% or more	I/O bottleneck is caused by excessive file I/O

Note to Table 7-3

If you suspect that you have an I/O bottleneck, but the histograms reveal neither excessive paging nor excessive locate misses, you may see if the number of I/O operations is balanced across the disks and controllers. To check this, you need to generate a comparator report as described in section PHASE 3 OF ANALYSIS.

If the histograms indicate a possible CPU bottleneck, or if they show a possible cause of an I/O bottleneck, you need to perform a second level analysis as described in the next section.

PHASE 2 OF ANALYSIS

Based on your analysis of the histograms in the previous section, you may need to perform a second level analysis of the data.

If you suspect either a CPU bottleneck or an I/O bottleneck that is caused by an excessive page fault rate or locate misses, you need to generate the following Chart Reports.

- o Chart for the SYS-CPU resource and the ISU 1 Idle attribute. (ISU means CPU.) P6550 and P850 users may generate an additional histogram for ISU 2 Idle and analyze it as for ISU 1 Idle.
- o Chart for the SYS-CPU resource and the CPU Util. Error attribute.
- o Chart for the SYS-IO resource and the IO Utilization attribute.
- o Chart for the SYS-IO resource and the Page Fault Rate attribute.
- o Chart for the SYS-LOCATE resource and the Locate Misses attribute.

Use Table 7-4 to identify the values that you may flag in the charts.

Table 7-4
Chart Analysis for CPU or I/O Bottlenecks

Chart	Values to Flag	Probable Meanings
ISU 1 Idle	1% or less	CPU bottleneck
CPU Util. Error	5% or more	I/O bottleneck if conditions noted under IO Utilization below are present.
IO Utilization	85% or more for 1 controller 160% or more for 2 controllers	I/O bottleneck if ISU 1 Idle is 10% or more at about the same time.
Page Fault Rate	15/sec or more for models to 2655 20/sec or more for 9650 to 9955 II	I/O bottleneck caused by excessive paging if IO Utilization is also excessive
Locate Misses	15% or more	I/O bottleneck caused by excessive file file I/O

If you believe that the system has a bottleneck, you need to proceed to section RECOMMENDATIONS FOR ENHANCING SYSTEM PERFORMANCE that appears later in this chapter.

PHASE 3 OF ANALYSIS

In this phase, you may generate comparator reports to determine if there is unbalanced I/O. If you have a CPU bottleneck, you could also generate a comparator report for the system users.

Finding Unbalanced I/O

It is possible that your Histograms in section PHASE 1 OF ANALYSIS indicate a possible I/O bottleneck but not its cause. This situation may happen when the number of I/O operations is not balanced across the disks on one controller and between the controllers on a system. To tell if this is the case, you may generate the following reports:

- o Comparator report for the SYS-DISK resource and the %Disk Drive Accesses attribute
- o Comparator report for the SYS-CONTRLR resource and the %Controller Operations attribute (for two or more controllers)

For each disk, the comparator report shows the lowest and highest percentage of accesses or operations and indicates the average by a hyphen (-). On these comparator reports, you may check that the percentage of accesses is about the same for each disk on a controller. The percentage of operations may be about the same for each controller in the system. If there is an imbalance, that could be the cause of the I/O bottleneck.

If you believe that the system has a bottleneck, you need to proceed to section RECOMMENDATIONS FOR ENHANCING SYSTEM PERFORMANCE that appears later in this chapter.

Finding the CPU Use per User

To tell how much of the CPU time was taken by the system users, you may generate the following report:

- o Comparator report for the USER-CPU resource and the %CPU Time in Period attribute

This report enables you to tell which user processes consume the most CPU time. For each user, the comparator report shows the lowest and highest percentage of CPU time and indicates the average by a hyphen (-).

PHASE 4 OF ANALYSIS

If you have not detected any other bottleneck, but the ISU 1 Idle Chart produced in section PHASE 2 OF ANALYSIS shows many occurrences where the idle percentage is less than 10%, you may have a bottleneck in the system overhead processes. This could be caused by either improper configuration or a bad controller that is causing excessive interrupts.

To determine if you have excessive system overhead, you may generate a histogram for each of the following SYS-CPU attributes. (These attributes are described in Table 4-1 of Chapter 4 as well as discussed in the glossary at the end of this guide.)

- o Clock Overhead
- o Frontstop Overhead
- o AMLC Overhead
- o MPC Overhead
- o PNC Overhead
- o Smlc Overhead
- o Ics Overhead
- o Gppi Overhead
- o Async. Overhead
- o Sync. Overhead
- o Disk Driver Overhead

If the sum of the values shown in the histograms seems to be greater than 25%, you may have a bottleneck and may generate a chart report to see the exact percentages for those system process overheads that seem to take up the most CPU time. In particular, an AMLC Overhead of 10% or more may indicate a bottleneck caused by noise on the lines.

If you believe that the system has a bottleneck, you need to proceed to section RECOMMENDATIONS FOR ENHANCING SYSTEM PERFORMANCE that appears later in this chapter.

PHASE 5 OF ANALYSIS

If the interactive response time is usually greater than 1 minute and you have gone through analysis phases 1 to 4 without finding a probable bottleneck, you may check for semaphore or lock bottlenecks. To do this, you will need to use the histograms and charts that were generated in Phases 2 and 3 for the following attributes:

- o ISU 1 Idle
- o Locate Misses

When ISU 1 Idle is 10% or more and the locate misses of 35% or more, but the IO Utilization is not excessive, there may be semaphore or lock bottlenecks.

If you believe that the system has a bottleneck, you need to proceed to the next section for recommendations on how to alleviate this situation.

RECOMMENDATIONS FOR ENHANCING SYSTEM PERFORMANCE

Earlier in this chapter you learned how to analyze PRIMAN reports to identify several possible bottlenecks in your system. The sources of the bottlenecks that you have been taught to identify are:

- o CPU-bound system
- o I/O-bound system caused by excessive paging
- o I/O-bound system caused by excessive file I/O
- o I/O-bound system caused by unbalanced I/O
- o Excessive system process overhead
- o Excessive tie-ups on semaphores and locks

Note

The symptoms of a system that is memory-bound are the same as one that is I/O bound. When a system is memory-bound, it will become I/O bound as well.

This section presents recommendations for enhancing the performance of systems that have one of the bottlenecks noted above. Most of the commands listed in these recommendations may be found in the System Administrator's Guide.

CAUTION

After you have changed something to alleviate a bottleneck, go through the PRIMON data collection procedure again as well as the PRIMAN report generation and interpretation phases. You must do this to be sure that the problem has been truly alleviated and has not inadvertently caused another problem.

CPU-Bound Recommendations

Implement only one of the following recommendations on your system before you remonitor and re-analyze your system performance using PRIMAN.

- o If your processor model number is 2250 or less, ask your Customer Service Representative to check that the memory is interleaved.

- o Use the CHAP command to give higher priorities and longer timeslices to interactive users. Decreasing the eligibility slice with the ELIGTS command favors shorter transactions for interactive users. (See the PRIMOS Commands Reference Guide or the System Operator's Guide for the details of these commands.)
- o Have differing classes of users with different default CHAP values.
- o Optimize user programs that use the most CPU time. Compile programs using the -OPTIMIZE compiler option. Load subroutines in the order of their frequency of use, which usually is not in alphabetical order. Also load subroutines together that call each other frequently. Consult the language reference manuals for details on the -OPTIMIZE compiler option.
- o Review the job mix and see which jobs may be deferred to non-peak hours using Batch. (See the Operator's Guide to the Batch Subsystem for information about Batch.)
- o Upgrade the CPU.

I/O-Bound Recommendations for System with Excessive Paging

Implement only one of the following recommendations on your system before you remonitor and re-analyze your system performance using PRIMAN.

- o Add a disk unit and use an alternate paging partition on it. If you already have more than one disk unit, use the ALTDEV and PRATIO configuration directives to equalize disk I/O.
- o Reduce the PRIMOS working set by making the values of configuration directives (such as NSEG, NTUSR, and AMLBUF) as small as possible.
- o Review job mix and see which jobs may be deferred to non-peak hours using Batch. (See the Batch Users Guide for information about Batch.)
- o Review the system-wide search rules for maximum efficiency. For example, put the most-used libraries and command UFDs first.
- o Decrease the MAXSCH value to reduce the number of concurrent processes.
- o Add more memory.

Additional Recommendations for Memory-Bound Systems: The symptoms and

recommendations for a memory-bound system, as noted earlier in this chapter, are the same as for an I/O-bound one caused by excessive paging. The following additional recommendations, however, are provided for memory-bound systems.

- o To make more use of EPFs, use BIND rather than SEG when linking and loading your programs.
- o Avoid calls to CP\$ or R mode interludes.
- o Reduce the user working set by loading a program's subroutines in order of their frequency of use, which is usually not in alphabetical order. Also load subroutines together that call each other frequently.
- o Reduce the number of command levels, through EDIT_PROFILES, that any user may have active.
- o Reduce the number of phantoms and batch queues through the NPUSR configuration directive and BATGEN command. (See the Operator's Guide to the Batch Subsystem for information about Batch.

I/O-Bound Recommendations for System with Excessive File I/O

Implement only one of the following recommendations on your system before you remonitor and re-analyze your system performance using PRIMAN.

- o Scale the number of Locate buffers upwards through the NLBUF configuration directive. Do not just set the number of Locate buffers at its maximum value because doing that could cause memory-bound problems.
- o Add a disk unit and use an alternate paging partition on it. If you already have more than one disk unit, use the ALTDEV and PRATIO configuration directives to equalize disk I/O.
- o Restructure programs to move larger blocks of data at a time.
- o Review the job mix and see which jobs may be deferred to non-peak hours using Batch. (See the Operator's Guide to the Batch Subsystem for information about Batch.)

I/O-Bound Recommendations for a System with Unbalanced I/O

Implement only one of the following recommendations on your system before you remonitor and re-analyze your system performance using PRIMAN.

- o Move directories and/or paging partitions to less busy disks.

Excessive System Overhead Recommendations

Implement only one of the following recommendations on your system before you remonitor and re-analyze your system performance using PRIMAN.

- o If you are using AMLC lines, ensure that the baud rate on the last line of the last board is not greater than 300 baud. (ICS lines are not affected by this.)
- o Disable unterminated lines through either the SET_ASYNC command with the -PROTOCOL TTYNOP argument, or the AMLC command with the TTYNOP argument. (The System Administrator's Guide discusses these commands.)
- o Ask your Customer Service Representative to check controller placement in the backplane and ensure that cables, modems, or terminals are not generating meaningless characters.

Semaphore/Lock-Bound Recommendations

Implement only one of the following recommendations on your system before you remonitor and re-analyze your system performance using PRIMAN. Implementing two or more of the following recommendations before checking to see how they affect your system may result in thorough confusion.

- o Raise the MAXSCH value to increase the number of concurrent processes. Note, however, that if your system has a relatively small amount of memory, this may cause problems.
- o Make sure that programs are structured so that the reads occur at the top and writes occur at the bottom. Don't put reads and writes inside innermost loops.
- o Ensure that the file system read/write lock is set for N readers or 1 writer through the RWLOCK configuration directive with a value of 1.

APPENDIX A
PRIMON ERROR MESSAGES

PRIMON ERROR MESSAGES

This section lists error messages that may appear when using PRIMON and provides recommended actions for them.

- o A token was longer than 1024 characters in picture

A file in a PRIMAN* subdirectory has an incorrect entry. Notify your System Administrator or Prime Field Representative.

- o Can not set up the terminal

A file in a PRIMAN* subdirectory has an incorrect entry. Notify your System Administrator or Prime Field Representative.

- o Can not open output file

You may have insufficient access rights. Notify your System Administrator or Prime Field Representative.

- o Can't use display and file option at the same time

When invoking PRIMON, use the options for either viewing (display) or analyzing data over time (file), but not both. Refer to the invocation sections in Chapters 2 and 3 for specifics.

- o Can't use -output and -no_average at the same time

The -no_average option can be included only when invoking PRIMON for viewing the displays.

- o Can't use -output and -numeric at the same time

The -numeric option can be included only when invoking PRIMON for viewing the displays.

- o Can't use -user and -no_user_data at the same time

Specify one or the other. Refer to the invocation section in Chapter 2 for specifics.

- o CPL mode only

A file in a PRIMAN* subdirectory has an incorrect entry. Notify your System Administrator or Prime Field Representative.

- o Data type UNCL given more than once

A file in a PRIMAN* subdirectory has an incorrect entry. Notify your System Administrator or Prime Field Representative.

- o Default value may not be given for this data type

A file in a PRIMAN* subdirectory has an incorrect entry. Notify your System Administrator or Prime Field Representative.

- o Default value not in proper format in picture

A file in a PRIMAN* subdirectory has an incorrect entry. Notify your System Administrator or Prime Field Representative.

- o Help file not available

There is a problem in the PRIMAN* HELP subdirectory. Notify your System Administrator or Prime Field Representative.

- o Illegal option argument name in picture

A file in a PRIMAN* subdirectory has an incorrect entry. Notify your System Administrator or Prime Field Representative.

- o Illegal repeat count in picture

A file in a PRIMAN* subdirectory has an incorrect entry. Notify your System Administrator or Prime Field Representative.

- o Implementation error in picture parse

A file in a PRIMAN* subdirectory has an incorrect entry. Notify your System Administrator or Prime Field Representative.

- o Incorrect command line format

A file in a PRIMAN* subdirectory has an incorrect entry. Notify your System Administrator or Prime Field Representative.

- o Missing or illegal delimiter in picture

A file in a PRIMAN* subdirectory has an incorrect entry. Notify your System Administrator or Prime Field Representative.

- o Must Specify a number with the -TIMES option

Retype the PRIMON command so that a number from 1 to 32767 follows -TIMES.

- o Must Specify 1 to 6 user numbers with the -USER option

Retype the PRIMON command so that at least one (and at most 6) user number follows -USERS.

- o No filename specified with -OUTPUT option

Retype the PRIMON command so that a filename follows -OUTPUT.

- o No terminal type specified with -TERM option

Retype the PRIMON command so that a terminal type (e.g., PST100, PT200, PT45) follows -TTP.

- o Null argument group in picture

A file in a PRIMAN* subdirectory has an incorrect entry. Notify your System Administrator or Prime Field Representative.

- o Option args precede object args in picture

A file in a PRIMAN* subdirectory has an incorrect entry. Notify your System Administrator or Prime Field Representative.

- o Pix definition file not available

There is a problem in the PRIMAN* PIX subdirectory. Notify your System Administrator or Prime Field Representative.

- o Problem with LIMIT file. Defaults being used

A file in a PRIMAN* subdirectory has an incorrect entry. Notify your System Administrator or Prime Field Representative.

- o Revision file not found

There is a problem in the PRIMAN* ETC subdirectory. Notify your System Administrator or Prime Field Representative.

- o Time must be in the Military format HH:MM

Enter the time as for a 24-hour clock, where midnight is 00:00, 4 P.M. is 16:00, and so on.

- o Too many instances of an object in a command line

A file in a PRIMAN* subdirectory has an incorrect entry. Notify your System Administrator or Prime Field Representative.

- o Too many object arguments in command line

A file in a PRIMAN* subdirectory has an incorrect entry. Notify your System Administrator or Prime Field Representative.

- o Unknown data type name in picture

A file in a PRIMAN* subdirectory has an incorrect entry. Notify your System Administrator or Prime Field Representative.

- o Unknown option in command line

A file in a PRIMAN* subdirectory has an incorrect entry. Notify your System Administrator or Prime Field Representative.

- o User must enter a terminal type

Specify your terminal type: PT200, PST100, or PT45.

- o User Number n is no longer Logged in

Retype the PRIMON command, including the -USERS option, but omit the number of that user who is no longer logged in.

- o Wrong version of GMETR\$ on this system

Notify your System Administrator or Prime Field Representative.

APPENDIX B
PRIMAN ERROR MESSAGES

This section lists error messages that may appear when using PRIMAN and provides recommended actions for them. In this list, a word enclosed in angle brackets, such as <date>, stands for the actual number or name that appears in the error message.

- o <date> is not a valid ISO or USA date

With the cursor in a Window field, specify the date in mm/dd/yy format.

- o <device-name> is an invalid output DEVICE

With the cursor in the Device field, press the F5 key and select either LPR or PTX.

- o <entry-typed> is an invalid entry for this field

With the cursor in the field, press the F5 key and select an entry. If the field has no auto-select options, refer to the appropriate text in Chapter 5 and type the correct entry.

- o <entry-typed> is not a valid number

Type a number in the field. This message can appear for the Scale Range, Sample Factor, and Copies fields, as they require numbers.

- o `<pathname>` is an invalid PATHNAME

Type the correct pathname.

- o `<report-style-name>` is an invalid REPORT STYLE

With the cursor in the Report Style field, press the F5 key and select CHART, COMPARITOR, STATISTICS, or HISTOGRAM.

- o `<request-type-name>` is an invalid REQUEST TYPE

With the cursor in the Request Type field, press the F5 key and select either SYSTEM or USER.

- o `<resource-name>` is an invalid RESOURCE

With the cursor in the Resource field, press the F5 key and select a resource.

- o `<window-type-name>` is an invalid WINDOW TYPE

With the cursor in the Window Type field, press the F5 key and select either INC or AVE.

- o A token was longer than 1024 characters in picture

A file in a PRIMAN* subdirectory has an incorrect entry. Notify your System Administrator or Prime Field Representative.

- o A valid `<field-name>` must be specified

With the cursor in the field in question, press the F5 key and select an entry.

- o Can not open output file

You may not have sufficient access rights or the disk may be full. Notify your System Administrator or Prime Field Representative.

- o Can not set up the terminal

Notify your System Administrator or Prime Field Representative.

o CPL mode only

A file in a PRIMAN* subdirectory has an incorrect entry. Notify your System Administrator or Prime Field Representative.

o Data type UNCL given more than once

A file in a PRIMAN* subdirectory has an incorrect entry. Notify your System Administrator or Prime Field Representative.

o Default value may not be given for this data type

A file in a PRIMAN* subdirectory has an incorrect entry. Notify your System Administrator or Prime Field Representative.

o Default value not in proper format in picture

A file in a PRIMAN* subdirectory has an incorrect entry. Notify your System Administrator or Prime Field Representative.

o Errors have prevented execution

One or more of your requests contained incorrect or incomplete information. Refer to Chapter 5 and type in complete, correct requests that you can resubmit to PRIMAN.

o Help file not available

There is a problem in the PRIMAN* HELP subdirectory. Notify your System Administrator or Prime Field Representative.

o Illegal option argument name in picture

A file in a PRIMAN* subdirectory has an incorrect entry. Notify your System Administrator or Prime Field Representative.

o Illegal repeat count in picture

A file in a PRIMAN* subdirectory has an incorrect entry. Notify your System Administrator or Prime Field Representative.

o Implementation error in picture parse

A file in a PRIMAN* subdirectory has an incorrect entry. Notify your System Administrator or Prime Field Representative.

- o Incorrect command line format

A file in a PRIMAN* subdirectory has an incorrect entry. Notify your System Administrator or Prime Field Representative.

- o Invalid combination of <field1> and <field2>

With the cursor in <field1>, press the F5 key and select an entry. Repeat this process for <field2>. o Invalid response; press CANCEL

Press CANCEL to cause the message to disappear.

- o Missing or illegal delimiter in picture

A file in a PRIMAN* subdirectory has an incorrect entry. Notify your System Administrator or Prime Field Representative.

- o Null argument group in picture

A file in a PRIMAN* subdirectory has an incorrect entry. Notify your System Administrator or Prime Field Representative.

- o Option args precede object args in picture

A file in a PRIMAN* subdirectory has an incorrect entry. Notify your System Administrator or Prime Field Representative.

- o Pix definition file not available

There is a problem in the PRIMAN* ETC subdirectory. Notify your System Administrator or Prime Field Representative.

- o Revision file not found

There is a problem in the PRIMAN* ETC subdirectory. Notify your System Administrator or Prime Field Representative.

- o The file <filename> already exists. Do you want to overwrite?

If you would not mind losing the previous contents of filename, press Y. If you wish to save the contents of filename, press N. Enter another filename.

o The file <filename> contained errors; these fields will be blank
Position the cursor at the fields that contain errors and type correct entries for them.

o The file <filename> does not exist

Enter the correct name of the desired file.

o The maximum number of requests has been exceeded

The maximum number of requests is 5. No more requests than this can be entered before saving them to a file.

o The request processor failed to invoke; code

Note down the code number that appears and call your System Administrator or Prime Field Representative.

o There is no automatic selection available for this field

You must type the entry for this field yourself. If you need help in filling out this field, refer to its description in Chapter 5.

o Too many instances of an object in a command line

A file in a PRIMAN* subdirectory has an incorrect entry. Notify your System Administrator or Prime Field Representative.

o Too many object arguments in command line

A file in a PRIMAN* subdirectory has an incorrect entry. Notify your System Administrator or Prime Field Representative.

o Unable to complete writing to the output file

The disk may be full. Notify your System Administrator or Prime Field Representative.

o Unable to open the output file

The disk may be full. Notify your System Administrator or Prime Field Representative.

- o Unknown data type name in picture

A file in a PRIMAN* subdirectory has an incorrect entry. Notify your System Administrator or Prime Field Representative.

- o Unknown option in command line

A file in a PRIMAN* subdirectory has an incorrect entry. Notify your System Administrator or Prime Field Representative.

- o User must enter a terminal type

Enter your terminal type: PST100, PT200, or PT45.

- o WARNING: the file <filename> already exists and will be overwritten

If you do not wish to have your file overwritten, type another filename.

- o You have no requests currently entered

Enter at least one request as described in Chapter 5 before asking PRIMAN to execute or save your requests.

- o You must select a valid RESOURCE first

With the cursor in the Resource field, press the F5 key and select a resource.

- o You must select a valid ATTRIBUTE first

With the cursor in the Attribute field, press the F5 key and select an attribute.

- o You must select a valid REQUEST type first

With the cursor in the Request Type field, press the F5 key and select either SYSTEM or USER.

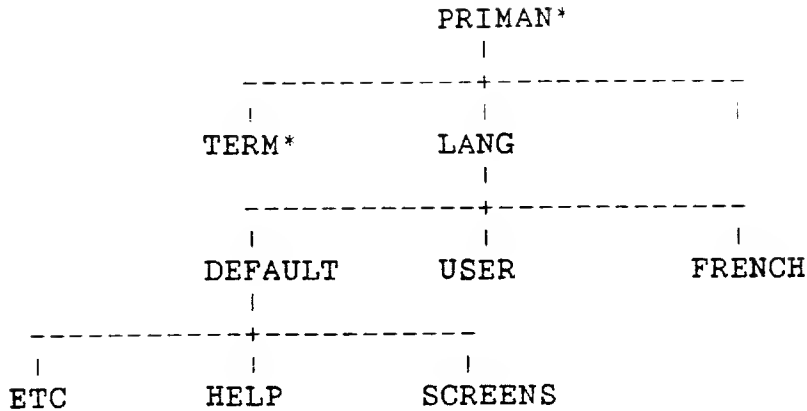
APPENDIX C

CUSTOMIZING THE USER ENVIRONMENT

This appendix tells how to customize the user environment by changing alarm threshold values used in PRIMON screens as well as any text a PRIMON or PRIMAN user may see. A discussion of the TERMCAAP facility is also included.

THE STRUCTURE OF THE PRIMON DIRECTORY

Before you change any screen text or alarm threshold value, you must know where to find their files. This section contains this information. The structure of the PRIMAN* directory appears in Figure C-1.



The Structure of the PRIMAN* Directory
Figure C-1

The text that you can modify appears in the files of the ETC, HELP, and SCREENS directories. The next section lists these files and tells how you can modify the text.

MODIFYING PRIMON AND PRIMAN TEXT

The ETC, HELP, and SCREENS directories contain files designed to enable you to easily modify user-visible text. This section lists and briefly describes these files. Files for PRIMON have an .MON suffix; those for PRIMAN have a suffix of .MAN.

Each file contains directions that you should follow when changing the text. These directions tell which words may not be modified and that the order may not be changed. You may use an editor such as EDITOR or EMACS to make the modifications.

The ETC Files

Filenames

ATTRIBUTES.MAN
 ERROR.MON and ERROR.MAN
 MESSAGE.MAN and MESSAGE.MON
 PIX.MAN and PIX.MON
 REVISION.MAN and REVISION.MON
 TEXT.MAN and TEXT.MON
 THRESHOLD.MON
 REPORT_TEXTS.MAN
 YES.MAN

Contents

PRIMAN resources and attributes
 Error messages
 Messages for command line in error
 Command line options
 Revision notice
 Text strings for screen responses
 PRIMON alarm thresholds
 Labels that appear in PRIMAN reports
 Allowable positive responses to a

yes/no question posed by PRIMAN

The HELP Files

<u>Filenames</u>	<u>Contents</u>
MAIN_HELP.MAN and MAIN_HELP.MON	PRIMON command line options

The SCREEN Files for PRIMON

<u>Filenames</u>	<u>Contents</u>
SCREEN_NAMES.MON	Screen names
HEADER.MON	Screen headers
FOOTER.MON	Screen footers
SYS_SCREEN.MON	General System Metering body
INT_SCREEN.MON	System Interrupt Metering body
CONTROLLER_SCREEN.MON	Controller I/O Operations per Second body
DISK_COUNT_SCREEN.MON	Disk I/O Operations per Second body
CONTROLLER_SCREEN.MON	Percent Controller I/O Time body
DISK_TIME_SCREEN.MON	Percent Disk I/O Time body
LOCATE_SCREEN.MON	Locate/Miss Metering body
ROAM_SCREEN.MON	ROAM File Metering body
BLKIO_SCREEN.MON	Block I/O Metering body
USERCP_SCREEN.MON	User CPU Metering body
USERIO_SCREEN.MON	User I/O Metering body
USERMEM_SCREEN.MON	User Memory Metering body
HELP_SCREEN.MON	Help body

The SCREEN Files for PRIMAN

<u>Filenames</u>	<u>Contents</u>
SCREEN_NAMES.MAN	Screen names
DEVICE_DET.MAN	Report Device Details body
MAIN.MAN	Main body
REPORT_DET.MAN	Report Details body
REQUEST_DET.MAN	Request Details body
RESOURCE_DET.MAN	Resource Details body
REQUEST_MENU.MAN	Menu for Request Number auto-select box
RESOURCE_MENU.MAN	Menu for Resource auto-select box
ATTRIBUTE_MENU.MAN	Menu for Attribute auto-select box
ORIENTATION_MENU.MAN	Menu for Request Type auto-select box
LOW_MENU.MAN	Menu for low end of Scale Range auto-select box
HIGH_MENU.MAN	Menu for high end of Scale auto-select box

LABEL_MENU.MAN	Menu for Axis Label auto-select box
REPORT_STYLE_MENU.MAN	Menu for Report Style auto-select box
HEADER_MENU.MAN	Menu for Report Header auto-select box
TITLE_MENU.MAN	Menu for Title Page auto-select box
CONDENSED_FILE_MENU.MAN	Menu for Data File auto-select box
REPORT_FILE_MENU.MAN	Menu for Report File auto-select box
SAMPLE_MENU.MAN	Menu for Sample Factor auto-select box
WINDOW_TYPE_MENU.MAN	Menu for Window Type auto-select box
SPOOL_DEVICE_MENU.MAN	Menu for Report Device auto-select box
SPOOL_COPIES_MENU.MAN	Menu for Copies auto-select box
LOCAL_MENU.MAN	Menu for Local Menu auto-select box

Note

The text for PRIMAN resources and their attributes are in the ATTRIBUTES.MAN file of the ETC directory.

CHANGING THRESHOLD VALUES

The alarm threshold values of PRIMON are in the ETC directory as presented in this Appendix. These values may be changed by using an editor such as EDITOR or EMACS. The default values of PRIMON alarm thresholds appear in Table C-1.

<u>PRIMON Field</u>	<u>Threshold Value</u>	<u>PRIMON Screen</u>
Percent CPU	75	General System Metering
Percent I/O	85	General System Metering
Percent IDLE	15	General System Metering
Page Faults per Second	10	General System Metering
Percent User CPU	50	User CPU Metering
Percent User I/O	50	User I/O Metering
Percent Locate Miss	20	Locate/Miss Metering

TERMCAP FACILITY

Introduction

TERMCAP is the name of a file that contains information about the operating features of many different terminals. A TERMCAP description for any given terminal is called an entry. Presently, the TERMCAP file contains entries for two hundred or so terminals and is available to all users. Some of these entries contain capabilities that are not supported by Prime, and thus are ignored by PRIMAN. This section describes only the TERMCAP capabilities that are presently supported by PRIMAN.

Terminals can differ greatly, because there is little standardization in design from one manufacturer to another. Before TERMCAP was developed, a programmer had to rewrite portions of the source code to create individual drivers for each terminal, and then recompile the entire program.

With TERMCAP, a programmer can add an entry to the TERMCAP file to support a new terminal without revising or recompiling the source code for the program. Because the file is used whenever PRIMAN is started up, all users on a system can use any entry in the TERMCAP file.

This section describes how to use TERMCAP with PRIMAN.

Note

This TERMCAP file is in the public domain and is made available to the user by courtesy of Prime Computer, Inc. Prime makes no representations or warranties whatsoever regarding this file, or the ability of any Prime software, when combined with this file, to operate on any terminals other than Prime terminals. Prime also disclaims any obligations to maintain or support this file or any similar file now or in the future.

When you are using a terminal definition from TERMCAP, the user interface to PRIMAN does not change. You can still type the command line

```
PRIMON -ttp type
```

or

```
PRIMAN -ttp type
```

PRIMAN also recognizes two global variables: the first, `.TERMINAL_TYPE$`, allows you to define your terminal type. If you set `.TERMINAL_TYPE$`, you do not need to use the `-TTP` option on the PRIMAN or PRIMON command line. The second variable, `.TERMCAP$`, lets you specify a pathname to a TERMCAP entry that is not in the TERMCAP file in PRIMAN*.

You can set two PRIMOS global variables that PRIMAN and PRIMON recognizes:

`.TERMINAL_TYPE$` This global variable contains the name of the terminal you wish to use. It will be used if you do not specify the `-TTP` option on the command line.

`.TERMCAP$` This global variable contains the user's TERMCAP

database pathname. If the user does not specify this pathname, the pathname PRIMAN*TERM*To-Be-Specified will be assumed. In addition, users can debug an entry of their own before adding it to the TERMCAP data base by using this variable to specify the name of the file that contains the entry.

APPENDIX D
ABBREVIATIONS AND GLOSSARY

This appendix contains a list of abbreviations for the PRIMAN resource attributes that are used in the PRIMAN request screens. In addition, this appendix provides a glossary of PRIMON and PRIMAN terms and resource attributes.

LIST OF ABBREVIATIONS

Table D-1
Abbreviations for PRIMAN Resource Attributes

Abbrev	Resource Attribute	Abbrev	Resource Attribute
%AMLC	Amc Overhead	%Util	%Disk Time Used In Period
%Async	Async. Overhead	Avg	Average Access Time
%Busy	%Disk Drive Busy Time	BCount	Disk Accesses (since boot)
%busy	%Controller Busy Time	Count	#Controller Operations
%Clock	Clock Overhead	Count	#Disk Drive Accesses
%Count	%Controller Operations	CPUtime	CPU Time Since Login
%Count	%Disk Drive Accesses	Ctlrs	Active Disk Controllers
%CPU	%CPU Time in Period	dCPU	CPU Time In Period
%CPU	CPU Utilisation	dI/O	IO Time In Period
%DMAovr	%Dma Overruns	Disk	Disk Accesses
%DSK	Disk Driver Overhead	Disks	Active Disk Drives
%Error	CPU Util. Error	DMAovr	#Dma Overruns
%FNT	Frontstop Overhead	Hangs	#Disk Time Out Hangs
%Found	Locate Finds	IO/S	IO Rate
%GPPI	Gppi Overhead	I/Otime	IO Time Since Login
%Hang	%Disk Time Out Hangs	LM/S	Locate Miss Rate
%Hit	Locate Hits	Loc/S	Locate Access Rate
%ICS	Ics Overhead	Locates	Locate Buffer References
%Idl1	ISU 1 Idle	Mem	Non-Shared Memory
%Idl2	ISU 2 Idle	ops	Operations Since Boot
%I/O	%IO Time In Period	Pages	Pages Available
%I/O	IO Utilization	PF/S	Page Fault Rate
%Miss	Locate Misses	Qwaits	#Disk Queue Waits
%MPC	Mpc Overhead	Segs	Segments Available
%ops	%Controller Operations	Segs	Segments Used
%Ovlp	CPU-Disk Overlap	Time	Disk Time Used In Period
%PNC	PNC Overhead	Time	Time Used In Period
%Qwait	%Disk Queue Waits	Used	Pages Used
%Same	Locate Same Hits	Users	Active Users
%Share	Locate Shared Hits	Used	Segments Used
%SLC	Smlc Overhead	Wire	Pages Wired
%Sync	Sync. Overhead	Wired	Pages Wired
%Util	%Time Used In Period		

GLOSSARY

- #Controller Operations (Count)
The number of disk I/O operations for a controller. (This is a PRIMAN SYS-CONTRLR attribute.)
- #Disk Drive Accesses (Count)
The number of accesses done to a disk drive. (This is a PRIMAN SYS-DISK attribute.)
- #Disk Queue Waits (Qwaits)
The number of times that a process had to wait to get a disk request block allocated. (This is a PRIMAN SYS-IO attribute.)
- #Disk Time Out Hangs (Hangs)
The number of disk operations that caused the controller to hang and time out. (This is a PRIMAN SYS-IO attribute.)
- #Dma Overruns (DMAovr)
The number of disk operations that resulted in DMA overrun errors. (This is a PRIMAN SYS-IO attribute.)
- %Controller Busy Time (%busy)
The percentage of the time that a controller was busy. (This is a PRIMAN SYS-CONTRLR attribute.)
- %Controller Operations (%Count)
The percentage of all disk I/O operations performed by a particular controller. (This is a PRIMAN SYS-CONTRLR attribute.)
- %Controller Operations (%ops)
The percentage of the total number of disk I/O operations performed by a particular controller since boot. (This is a PRIMAN SYS-CONTRLR attribute.)
- %CPU Time In Period (%CPU)
The percentage of CPU time used by this user.
- %Disk Drive Accesses (%Count)
The percentage of accesses to a disk drive out of the total number of accesses to all disk drives of a controller. (This is a PRIMAN SYS-DISK attribute.)
- %Disk Drive Busy Time (%Busy)
The percent of time since boot used by a drive in its operations out of the total time used by all disk drives of a controller. (This is a PRIMAN SYS-DISK attribute.)
- %Disk Queue Waits (%Qwait)
The percentage of disk I/O operations that required waiting for a disk request block. (This is a PRIMAN SYS-IO attribute.)

%Disk Time Out Hangs (%Hang)

The percentage of disk operations that resulted in controller hangs. (This is a PRIMAN SYS-IO attribute.)

%Disk Time Used In Period (%Util)

The percent of time used by a disk drive in its operations out of the total time used by all disk drives of a controller. (This is a PRIMAN SYS-DISK attribute.)

%Dma Overruns (%DMAovr)

The percentage of disk operations that resulted in DMA overruns. (This is a PRIMAN SYS-IO attribute.)

%IO Time In Period (%I/O)

The percentage of time in which I/O (disk) was in progress for this user.

%Time Used In Period (%Util)

The percentage of time spent performing disk I/O operations by a controller. (This is a PRIMAN SYS-CONTRLR attribute.)

Active Disk Controllers (Ctlrs)

The number of disk controllers that were performing some activity. (This is a PRIMAN SYS-ACTIVE attribute.)

Active Disk Drives (Disks)

The number of disk drives that were performing some activity. (This is a PRIMAN SYS-ACTIVE attribute.)

Active Users (Users)

The number of logged-in users who were conducting some activity. (This is a PRIMAN SYS-ACTIVE attribute.)

AMLC

The percentage of CPU time used by the AMLC (asynchronous multiline controller) process. (Appears on the PRIMON System Interrupt Metering Screen.)

Amlc Overhead (%AMLC)

The percentage of CPU time used by the AMLC (asynchronous multiline controller) device driver that services all AMLC boards in a system. (This is a PRIMAN SYS-CPU attribute.)

Async

The percentage of CPU time used by the asynchronous communication controller process. (Appears on the PRIMON System Interrupt Metering Screen.)

Async. Overhead (%Async)

The percentage of CPU time used by the ICS asynchronous device driver, which services all asynchronous lines on all ICS1, ICS2, ICS3 controllers in a system. This is a PRIMAN SYS-CPU attribute.)

Average Access Time (Avg)

The average time in milliseconds for each I/O operation on the drive since the system was booted. This gives an idea of how spread out the requests on the disk are. Drives with high locality of reference will show low times, and those with lots of seeking will show high times. (This is a PRIMAN SYS-DISK attribute.)

Block I/O Per Second

The number of block I/Os made in the system, per second. (Appears on the PRIMON Block I/O Metering Screen.)

Clock

The percentage of CPU time used by the realtime clock service process. (Appears on the PRIMON System Interrupt Metering Screen.)

Clock Overhead (%Clock)

The percentage of CPU time used by the realtime clock service process. (This is a PRIMAN SYS-CPU attribute.)

CPU-Disk Overlap (%Ovlp)

An estimate of the amount of time that disk I/O activity overlapped CPU activity. This value ranges from 0 to 100%. The formula is calculated as follows: $(\text{IO_time} - \text{idle_time}) * 100 / \text{IO_time}$. (This is a PRIMAN SYS-CPU attribute.)

CPU Time In Period (dCPU)

The CPU time, in seconds, used by this user.

CPU Time Since Login (CPUtime)

The CPU time, in seconds, used by this user since login.

CPU Utilisation (%CPU)

The percentage of time in which CPU time was charged to user processes. (For a P850, this is averaged between the two CPUs.) This value indicates how much of the CPU the users are consuming, but does not represent the total CPU utilisation. (This is a PRIMAN SYS-CPU attribute.)

CPU Util. Error (%Error)

The percentage of CPU time not accounted for, and presumably taken by interrupts, scheduler overhead, process exchange, and similar operations. (This is a PRIMAN SYS-CPU attribute.) See Table 4-1 of Chapter 4 for information on how this is calculated.

Disk Accesses (Disk)

The number of disk I/O operations performed. (This is a PRIMAN SYS-IO attribute.)

Disk Accesses since boot (BCount)

The number of accesses done to a disk drive since boot. (This is a PRIMAN SYS-DISK attribute.)

Disk Driver Overhead (%DSK)

The percentage of CPU time used by the disk driver processes.
(This is a PRIMAN SYS-CPU attribute.)

Disk Time Used In Period (Time)

The number of seconds used by the operations of a disk drive.
(This is a PRIMAN SYS-DISK attribute.)

Error

The percentage of CPU time not accounted for and presumably taken by interrupts, scheduler overhead, process exchange, and similar operations. (Appears on the PRIMON System Interrupt Metering Screen.) This value is calculated as follows.

1. Add the percentages of the system interrupts, idle time, and CPU time charged to user processes. (For a P850, divide this total by two.)
2. Subtract this value from 100%; the result is Error. This value can be negative if one or more processes have been overcharged with respect to CPU time.

Frontstop

The percentage of CPU time used by the P850 slave CPU realtime frontstop process. This number is always zero on non-P850 configurations. (Appears on the PRIMON System Interrupt Metering Screen.)

Frontstop Overhead (%FNT)

The percentage of CPU time used by the P850 slave CPU realtime frontstop process. This number is always zero on non-P850 configurations. (This is a PRIMAN SYS-CPU attribute.)

GPP

The percentage of CPU time used by the GPPI (general purpose controller) processes. (Appears on the PRIMON System Interrupt Metering Screen.)

Gppi Overhead (%GPPI)

The percentage of CPU time used by the GPPI (general purpose controller) processes. (This is a PRIMAN SYS-CPU attribute.)

ICS 1

The percentage of CPU time used by the intelligent line controller 1 process. (Appears on the PRIMON System Interrupt Metering Screen.)

ICS 2

The percentage of CPU time used by the intelligent line controller 2 process. (Appears on the PRIMON System Interrupt Metering Screen.)

Ics Overhead (%ICS)

The percentage of CPU time used by two interrupt processes that service and dispatch interrupts from ICS1 (Intelligent Communications Subsystem 1), ICS2, and ICS3 controllers. One process services the interrupts; the other handles requests from an ICS1, ICS2, or ICS3 for transmit or receive buffers. (This is a PRIMAN SYS-CPU attribute.)

IO Rate (IO/S)

The average number of disk I/O operations per second, including both file system and paging I/O. This is not the sum of the page faults and Locate misses since either one can produce more than one I/O operation. (This is a PRIMAN SYS-IO attribute.)

IO Time In Period (dI/O)

The disk I/O time, in seconds, used by this user.

IO Time Since Login (lI/Otime)

The disk I/O time, in seconds, used by this user since login.

IO Utilization (%I/O)

The average percentage of time that the disks were busy. (This is a PRIMAN SYS-IO attribute.)

ISU 1 Idle (%Idl1)

The percentage of idle CPU time. (For a P850, the percentage of master CPU idle time.) This shows roughly the percentage of CPU time not involved in user processes. (This is a PRIMAN SYS-CPU attribute.)

ISU 2 Idle (%Idl2)

The percentage of idle CPU time for the P850 slave CPU. This number is always zero on non-P850 configurations. (This is a PRIMAN SYS-CPU attribute.)

Locate Access Rate (Loc/S)

The Locate Buffer use rate in calls per second. (This is a PRIMAN SYS-LOCATE attribute.)

Locate Buffer References (Locates)

The total number of calls made to the file system associative buffer manager, Locate. (This is a PRIMAN SYS-LOCATE attribute.)

Locate Buffers

Locate buffers store the most recently and most frequently accessed disk records, thus reducing disk I/O. These buffers are most useful when the applications access the same file records repeatedly. The size of each Locate buffer is 2 Kbytes, and the default number of buffers is 64. The number that can be allocated, however, can range from 8 to 256. Increasing the number of Locate buffers too much for a particular application can tie down too much memory and cause an excessive page fault rate. This situation would cancel the advantage of reducing regular disk I/O. The optimal number of Locate buffers depends on the application.

Locate Finds (%Found)

The percentage of calls to Locate that found the desired record already in the Locate associative buffers. (This is a PRIMAN SYS-LOCATE attribute.)

Locate Hits (%Hit)

The percentage of calls to Locate that found the desired record. This is calculated as $100\% - \%Miss$. (This is a PRIMAN SYS-LOCATE attribute.)

Locate Miss Rate (LM/S)

The average number of Locate misses per second. A miss occurs when the requested record is not in the buffers and has to be retrieved from the disk. (This is a PRIMAN SYS-LOCATE attribute.)

Locate Misses (%Miss)

The percentage of calls to Locate that did not find the desired disk record in the buffers and had to perform an I/O operation. (This is a PRIMAN SYS-LOCATE attribute.)

Locate Same Hits (%Same)

The percentage of calls to Locate that needed the same record that the process had just previously located. (This is a PRIMAN SYS-LOCATE attribute.)

Locate Shared Hits (%Share)

The percentage of calls to Locate for a record that was already in use by another process. (This is a PRIMAN SYS-LOCATE attribute.)

Locates Per Second

The number of calls, per second, made to the file system associative buffer manager, Locate. The Locate buffers store the most recently and most frequently accessed disk records, thus reducing disk I/O. (Appears on the PRIMON Locate/Miss Metering Screen.)

Miss Per Second

The average number of Locate misses per second. A miss occurs when the requested record is not in the buffers and has to be retrieved from the disk. (Appears on the PRIMON Locate/Miss Metering Screen.)

MPC

The percentage of CPU time used by the MPC (printer, punch, tape reader) processes. (Appears on the PRIMON System Interrupt Metering Screen.)

Mpc Overhead (%MPC)

The percentage of CPU time used by the MPC (printer, punch, tape reader) processes. (This is a PRIMAN SYS-CPU attribute.)

Non-Shared Memory (Mem)

The number of pages resident in memory for the user at the time the report was generated. (Segments 0 through '3777 are allocated to user 1.) This number can also be used as a rough estimate of the user's working set if the system has at least 5 to 10 page faults per second.

Non-Tran Access Per Second

The number of times per second that ROAM file records were updated exclusive of transaction activity. (Appears on the PRIMON ROAM File Metering Screen.)

Operations Since Boot (ops)

The percentage of the total number of disk I/O operations performed since boot by a controller. (This is a PRIMAN SYS-CONTRLR attribute.)

Page Fault Rate (PF/S)

The page fault frequency in page faults per second. (This is a PRIMAN SYS-IO attribute.)

Page Faults

A page fault occurs when a needed page in physical memory is not there. As a result, the page must be paged in from disk to physical memory.

Page Faults per second

The page fault frequency rate. This system attribute has a default threshold value of 10 page faults per second. (Appears on the PRIMON General System Metering Screen.)

Pages Available (Pages)

The number of physical pages available. (This is a PRIMAN SYS-MEMORY attribute.)

Pages In Use

The number of physical pages in use by all users. (Appears on the PRIMON User Memory Metering Screen.)

Pages Used (Used)

The number of physical pages in use. (This is a PRIMAN SYS-MEMORY attribute.)

Pages Wired

The number of wired physical pages in use by all users. A wired page cannot be paged out of physical memory. (Appears on the PRIMON User Memory Metering screen.)

Pages Wired (Wired)

The number of wired pages. A wired page cannot be paged out of physical memory. (This is a PRIMAN SYS-MEMORY attribute.)

Pages Wired (Wire)

The number of wired pages in use by the user. A wired page cannot

be paged out of physical memory.

Percent Awrite

The percentage of asynchronous block I/Os that were write operations. (Appears on the PRIMON Block I/O Metering Screen.)

Percent CPU

The percentage of time in which CPU time was charged to user processes. (For a P850, this is averaged between the two CPUs.) This value indicates how much of the CPU the users are consuming as well as all system overheads. (Appears on the PRIMON General System Metering Screen.)

Percent CPU

The percentage of time in which CPU time was charged to all user processes. (For a P850, this is averaged between the two CPUs.) This value indicates how much of the CPU the users are consuming, but does not represent the total CPU utilization. (Appears on the PRIMON User CPU Metering Screen.)

Percent I/O

The average percentage of time that the disks were busy. (Appears on the PRIMON General System Metering Screen.)

Percent Found

The percentage of calls to Locate that found the desired records already in the associative buffers. (Appears on the PRIMON Locate/Miss Metering Screen.)

Percent I/O

The percentage of time in which I/O time was charged to all user processes. (Appears on the PRIMON User I/O Metering Screen.)

Percent IDLE

The percentage of idle CPU time. (For a P850, this is the average of the idle time between the two CPUs.) This shows roughly the percentage of CPU time not involved in user processes. (Appears on the PRIMON General System Metering Screen.)

Percent Miss

The percentage of calls to Locate that did not find the desired disk record in the buffers and had to perform an I/O operation. (Appears on the PRIMON Locate/Miss Metering Screen.)

Percent Read

The percentage of all block I/Os that were read operations. (Appears on the PRIMON Block I/O Metering Screen.)

Percent Same

The percentage of calls to Locate that needed the same record that the process had just previously located. (Appears on the PRIMON Locate/Miss Metering Screen.)

Percent Shared

The percentage of calls to Locate for a record that was already in use by another process and thus is being shared. (Appears on a PRIMON Locate/Miss Metering Screen.)

Percent Write

The percentage of all block I/Os that were write operations. (Appears on the PRIMON Block I/O Metering Screen.)

PNC

The percentage of CPU time used by the PRIMENET Node Controller process. (Appears on the PRIMON System Interrupt Metering Screen.)

PNC Overhead (%PNC)

The percentage of CPU time used by the PRIMENET Node Controller process. (This is a PRIMAN SYS-CPU attribute.)

Read Requests Per Second

The number of read requests per second made to the ROAM files. (Appears on the PRIMON ROAM File Metering Screen.)

Retrieval Access Per Second

The number of times per second that ROAM file records were retrieved for reading during transactions. (Appears on the PRIMON ROAM File Metering Screen.)

Segments Available (Segs)

The number of segments available. (This is a PRIMAN SYS-MEMORY attribute.)

Segments Used (Used)

The number of segments in use. (This is a PRIMAN SYS-MEMORY attribute.)

Segments Used (Segs)

The number of segments in use by the user.

SMLC

The percentage of CPU time used by the SMLC (synchronous multiline controller) process. (Appears on the PRIMON System Interrupt Metering Screen.)

Sm1c Overhead (%SLC)

The percentage of CPU time used by the SLC (synchronous line controller) device driver that services all synchronous lines on the following controllers for all synchronous products that can use these controllers. (This is a PRIMAN SYS-CPU attribute.)

MDLC - Multiple Data Link Controller
HSSMLC - High Speed Synchronous Multiline
Controller
SMLC - Synchronous Multiline Controller

Sync

The percentage of CPU time used by the synchronous communication controller process. (Appears on the PRIMON System Interrupt Metering Screen.)

Sync. Overhead (%Sync)

The percentage of CPU time used by the ICS synchronous device driver, which services all synchronous lines on all ICS1, ICS2, and ICS3 controllers in a system for all synchronous products except SNA. (This is a PRIMAN SYS-CPU attribute.)

Time Used In Period (Time)

The time, in seconds, spent performing disk I/O operations on a controller. The per-drive information in some cases may not include time spent pre-seeking. (This is a PRIMAN SYS-CONTRLR attribute.)

Total Pages on System

The number of physical pages on the system. (Appears on the PRIMON User Memory Metering Screen.)

Update Access Per Second

The number of times per second that ROAM file records were updated during transactions. (Appears on the PRIMON ROAM File Metering Screen.)

Write Requests Per Second

The number of write requests per second made to the ROAM files. (Appears on the PRIMON ROAM File Metering Screen.)